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## **(B)orders in ancient weaving and archaic Greek poetry**

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In this chapter we offer an investigation of textile terms where they are used for describing intellectual production or knowledge (*epistēmē*) in ancient texts. We focus on archaic Greek poetry as well as on selected philosophical works and experience from weaving experiments. The choice of the passages and the material to be discussed as well as the way the argument is built up reflect two different but – we believe – complementary approaches to the topic we explore throughout this chapter: one is guided by an interest in ancient mathematics and philosophy and the other draws on literary criticism. Both have a role to play when tracing and contextualizing the (somewhat elusive) technological significance of textile imagery for archaic poetry and prose as well as for philosophy. This study arises from a common interest in the question of how ancient textile production, and particularly weaving, might have affected the very early discourse on poetry-making and the question of how poetic composition or the composition of texts as a *technē* might resemble the order of nature. We therefore lay emphasis on the connection of art, technology, and nature that is encompassed by the ancient term *technē* and embraces weaving as well as forging, writing a poem or a philosophical dialogue. In all such cases, we see a concept of *technē* at work that refers to a notion of the genesis of cosmic order that has never been explicated. In some instances it is best explained by weaving. Despite the obvious difference in the subjects of our interest, we build our arguments on this shared foundation.

The passages we refer to are commonly perceived as metaphorical. We focus instead on the German philosopher Hans Blumenberg's linking of metaphors and technology. Here, metaphors indicate a technological language prior to the era of proper technology.<sup>1</sup> As the technological aspects of Blumenberg's philosophy and history of science are not very well known even in Germany, we will provide a short introduction.

### ***Blumenberg's itinerary from technology to metaphor and back again***

In the 1950s, Blumenberg published a series of articles concerning technology, investigating its influence on our image of man (*Bild des Menschen*) and the autonomy or powerlessness (*Ohnmacht*) of human beings facing the intrinsic logic of the world of machines.<sup>2</sup> Blumenberg thus scrutinises the history of science in its changes avoiding to subscribe a history of inventions and inventors or technological problems. To Blumenberg, it is necessary to verify in every case the relation and exchange between idea and matter, or:

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<sup>1</sup> The term 'proper technology' indicates that most scholars use the term technology as applying to the result of industrialization in the 19th century.

<sup>2</sup> Cf. Blumenberg 2015; cf. the epilogue of the editors Schmitz and Stiegler 2015, 281-298.

mind and technology.<sup>3</sup> This project he later called “Geistesgeschichte der Technik”,<sup>4</sup> which might be translated as “history of technological ideas” and thus reacts ironically to the usual way of writing histories of technology as well as to new sociological explanations of this history.<sup>5</sup>

Blumenberg claims that an analysis of the backdrop for the origins of technology in terms of the historical development of ideas is lacking.<sup>6</sup> He starts outlining this development by investigating technology or *technē* in ancient Greece. The result has been summarised thus: “For the Greeks, the notion of *technē* summed up those abilities and skills which follow nature on its own course of becoming and perfection, and, in following nature, offer it help. *Technē* promotes and sustains *physis*.”<sup>7</sup> But *technē* also figures as the very beginning of things when the godly creator is called *demiourgos* (artificer, craftsman, *Timaeus*, 28a),<sup>8</sup> or even *phytourgos* (begetter, father, lit. gardener; *Republic* 597d) by Plato.<sup>9</sup> *Technē* imitates *physis* since *physis* is made by *technē*.<sup>10</sup>

To Blumenberg, it was the sophists that introduced the idea of *thesis*: the postulation of something not already given.<sup>11</sup> They demonstrate how *technē* can be isolated and independent from nature as being and truth. They offered a training in tricks of speech without respect to justice, and trained know-how instead of know-what. It is the birth of the *rhetorikē technē* and the framework for the category that is later called ‘metaphor’.<sup>12</sup> From that moment onwards, philosophy takes as its task to separate itself from this type of speech that is not concerned with truth but with persuasion: “Plato’s rejection of the sophists’ technique had the implication of *banning technology from the intellectual legitimacy of the European tradition*.”<sup>13</sup>

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<sup>3</sup> Cf. Schmitz and Stiegler 2015, 289.

<sup>4</sup> Blumenberg 2009, published posthumously. The manuscripts in the archive in Marbach are dated to 1966/67. Cf. Blumenberg 2015, 278. If not stated otherwise, translations are by the authors of this chapter. In some cases, we give the German original text in the notes.

<sup>5</sup> In fact Blumenberg himself states that “the term ‘history of ideas’ does not sound good any more.” Blumenberg 2009, 51. Taking into account that the manuscripts were finished 1966 after the publication of “The Copernicanic Turn” (*Die kopernikanische Wende*, 1965) and at the same time as “The Legitimacy of the Modern Age” (*Die Legitimität der Neuzeit*, 1966), this might refer to the works of Thomas S. Kuhn who also investigated the Copernicanic revolution and the role of metaphors and paradigms in science (Kuhn 1957, 1962). For Blumenberg on Kuhn cf. Blumenberg 1996, 540-541; Blumenberg 1983, 467; Ingram 1993, esp. 23.

<sup>6</sup> Cf. Blumenberg 2015, 23.

<sup>7</sup> Campe 2000, 114.

<sup>8</sup> On technological imagery drawn from arts and crafts in the *Timaeus* in the context of a comprehensive investigation of the Greek conception of the *kosmos* as an artefact, see Lloyd 1966, 277-285, who notes that “πλέκειν (plait) and ὑφαίνειν (weave) and their compounds are used to describe the joining together of soul and body (36e2), the interlacing of the veins (77e1) and so on”.

<sup>9</sup> Cf. Blumenberg 2015, 99.

<sup>10</sup> An excellent treatment of the archaic and early classical conception of *technē*, especially in relation to the emergence of the idea of poem/song “as verbal craftsmanship” in early 5<sup>th</sup> century choral lyric is Ford 2002, 93-157 (quote from p. 93), with further bibliography. See also Durante 1976, 170-179. On the interesting etymological connection between the root of Greek *tektōn* ‘carpenter’ and *technē*, and Latin *texō* (‘weave, join, carpenter’) see Nagy 1996, 75, who concludes that “[T]hese and other such facts lead to the general conclusion that the metaphor of carpentry as songmaking in Indo-European languages is parallel to the metaphor of weaving.”

<sup>11</sup> Blumenberg 2015, 97. On the archaic poetic conception of *thesis* in the sense of *poiesis*, i.e. of poetry as ‘composition’ or ‘ordered structure of words’ see Gentili 1990, 50 and Pindar *O.* 3.8 (ἐπέων θέσις). On *logos* as *technē* in Gorgias in the context of the Sophists’ ‘materialistic poetics’ see Ford 2002, 172-187.

<sup>12</sup> Metaphor is meant here in the sense of a figure of speech, as it was to be defined and used by early rhetoricians. To Blumenberg, there cannot be something like a definition of a metaphor, but only historical cases where we can find certain functions of language that are called metaphorical.

<sup>13</sup> “... Platons Abweisung der Sophistik [implizierte] die *Ausschließung der Technik aus der geistigen Legitimität der europäischen Tradition*” (Blumenberg 2015, 197, emphasis by Blumenberg).

But this ban was not characteristic of antiquity. The final dissection of nature and technology, according to Blumenberg, is a result of the Christian concept of creation and might be exemplified by the case of weaving coloured garments: “A polemic against some textile refinements can be found with some patristic authors reasoning god would have created coloured sheep if he had wished men to wear coloured clothes.”<sup>14</sup>

In early modern times, the foundation of pure reason followed this dissection of nature and technology and masked the historical and practical condition of theory. Blumenberg refers here to a most influential example: “Descartes obviously disavowed the historical background that provided him with decisive suggestions for the new idea of science, in order to establish the myth of an absolute beginning through reason assuring itself.”<sup>15</sup>

At the famous Jesuit school *La fleche*, Descartes not only learned mathematics and philosophy but also fencing and tennis. On fencing, he later wrote a geometrical treatise; tennis provided him with metaphors for his theory of light.<sup>16</sup> The value of such body technologies for science and philosophy remains however marginal, because, when they appear on paper they are perceived as rhetorical tropes and then belong to the realm of literary style. According to Blumenberg, Descartes aimed at a terminology where the presence and precision of given facts is captured by defined terms/concepts. Metaphors instead only have a meaning in functional transition; in metaphor, the human mind hurries ahead the execution of reasoning.<sup>17</sup> To Descartes, only arithmetic and geometry provide reliable and evident knowledge.

Above, we quoted from a publication that does not deal with technology at first sight. In 1960, Blumenberg published a volume in the German series *Archive for the history of concepts*<sup>18</sup> entitled “Paradigms of metaphorology” dealing with so-called ‘absolute metaphors’ as devices for the development of concepts in the philosophical tradition.<sup>19</sup> Absolute metaphors<sup>20</sup> stand in for missing concepts in cases of logical awkwardness (*logische ‘Verlegenheit’*)<sup>21</sup> and they resist attempts of finally making concepts out of them. They answer to questions like “What is truth?”, “What is man?” “What is God?” “How is the world made?”. To Blumenberg such metaphors force us to re-think the relation of imagination and *logos*. They show that imagination is not a reservoir of images that, element by element, dissolve into proper concepts in the course of history. Rather it is a catalytic domain that enriches the world of concepts without its basic stock ever being consumed.<sup>22</sup>

Also metaphorology is a historical project. Absolute metaphors change in the course of history and thus reflect changes in the approach to fundamental questions. Metaphors appear to be a technology to situate such questions. Campe, who develops in detail the connection

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<sup>14</sup> Cf. Blumenberg 2015, 106.

<sup>15</sup> Blumenberg 2015, 235: “*Descartes* hat den geschichtlichen Hintergrund erkennbar verleugnet, aus dem ihm entscheidende Anregungen für die neue Wissenschaftsidee zugekommen waren, um den Mythos vom absoluten Anfang durch die sich selbst vergewissernde Vernunft etablieren zu können”. (Emphasis by Blumenberg).

<sup>16</sup> Cf. Specht 1996, XVI.

<sup>17</sup> Blumenberg 1960, 7.

<sup>18</sup> Original title *Archiv für Begriffsgeschichte*.

<sup>19</sup> Blumenberg 1960; cf. Campe 2000, 105. For Blumenberg’s position within the discourse of ‘historical poetics’ see now Maslov 2015, 137 n. 58.

<sup>20</sup> Examples for such metaphors are “Macht der Wahrheit” (power of truth), cf. Blumenberg 1960, 12-18, “Wahrscheinlichkeit” (probability), cf. Blumenberg 1960, 88-105, “Wirklichkeit” (reality), cf. Blumenberg 1981. Some of these lose their metaphorical character when translated into English.

<sup>21</sup> Blumenberg 1960, 9.

<sup>22</sup> Blumenberg 1960, 10: “Der Aufweis absoluter Metaphern müßte uns wohl überhaupt veranlassen, das Verhältnis von Phantasie und Logos neu zu durchdenken, und zwar in dem Sinne, den Bereich der Phantasie nicht nur als Substrat für Transformationen ins Begriffliche zu nehmen — wobei sozusagen Element für Element aufgearbeitet und umgewandelt werden könnte bis zum Aufbrauch des Bildervorrats —; sondern als eine katalysatorische Sphäre, an der sich zwar ständig die Begriffswelt bereichert, aber ohne diesen fundierenden Bestand dabei umzuwandeln und aufzuzehren.”

of technique and metaphor in Blumenberg's work, concludes: "What is at stake in the exploration of metaphors in scientific texts is the impact of 'the technical' (*das Technische*) in science and in the text of philosophy."<sup>23</sup>

Blumenberg states: "Man *is* a technical being" ("Der Mensch *ist* ein technisches Wesen")<sup>24</sup>. Until the 1960s, he claims man's natural deficiency in environmental adaption as reason for this statement. Later Blumenberg withdraw from this reasoning and took 'the technical' as a human condition independent from the idea of deficiency. He then stressed the role of 'life-world' (a concept inherited from Husserl's phenomenology) for the history of technology and explored the relation of life-world and technology in several case studies. Life-world here refers to the seemingly self-evident character of the reality at hand, leading to assumptions such as nature being opposed to technology or technology being applied science or, in our case, the easy availability and cheapness – and thus worthlessness – of textiles.<sup>25</sup> As we already heard, for the ancient Greeks the term *technē*, being at the root of our word technology, shows no opposition against nature<sup>26</sup> and against the second assumption Blumenberg argues: "Technology can only be applied science because this science already originates in a technical understanding of being and truth."<sup>27</sup> To question the third assumption by objecting to the tradition that treats weaving as mythical or metaphorical subject will be part of our chapter.

### **Textiles within the framework of technization<sup>28</sup>**

The worthlessness of textiles may be illustrated by the way in which Campe introduces a metaphor for Blumenberg's notion of metaphorology.<sup>29</sup> The integration of metaphorology and technology is underlined by a term Blumenberg used in explaining why a theory of metaphor could not result in a proper philosophical theory: *Halbzeug*. This evokes Heidegger's *Zeug* and his philosophy of being at the beginning of the paradigms for a metaphorology: "What I will present here is a mere half-stuff [*Halbzeug*] and the perfection and seamlessness with which one can speak about 'Being' is in this discursive field, the field of philosophical metaphors, utterly unreachable."<sup>30</sup>

According to Campe, *Halbzeug* "is a *terminus technicus* used exclusively in industrial technology" referring to things created from raw materials which are later made into finished products: "It renders invisible the raw material out of which it is made without evoking the technical application, which only the finished product will demonstrate."<sup>31</sup>

Campe's argument suggests that this was going on in Blumenberg's mind. However, a footnote surprisingly concedes that half-stuff as well as *Halbzeug* was and is still used in paper manufacture and the origin of the word lies there. In fact the technical encyclopaedias until roughly the turn of the 20th century only know half-stuff as a term in paper production, be it manufactured or industrialised.<sup>32</sup> The term denotes the disintegrated rags, the worthless

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<sup>23</sup> "In der Untersuchung der Metaphern im Text der Wissenschaft geht es um die Wirkung des Technischen in der Wissenschaft und im Text der Philosophie." Campe 2009, 284, translation by the authors. The German article is an extended version of the former English one, published in 2000. Cf. Mende 2009, 28, n. 120.

<sup>24</sup> Blumenberg 2015, 18.

<sup>25</sup> See footnote 55 below on the 'Primark-effect'.

<sup>26</sup> Cf. Blumenberg 2015, 19.

<sup>27</sup> Blumenberg 2015, 45.

<sup>28</sup> 'Technization' translates the German word *Technisierung* (cf. the chapter *Lebenswelt und Technisierung unter Aspekten der Phänomenologie*, in Blumenberg 2015, 163-202; cf. also Campe 2000, 109). Where technology (German: *Technik*) refers to the product, technization refers to the process of becoming.

<sup>29</sup> Blumenberg never gave a definition of what a metaphor or a metaphorology is.

<sup>30</sup> Blumenberg 1960, 29, here quoted after Campe 2000, 106.

<sup>31</sup> Campe 2000, 107.

<sup>32</sup> For example cf. Krünitz 1807, 590-595 and 625-626, also online at <http://www.kruenitz1.uni-trier.de/> where the encyclopedia is called one of the most important sources on the history of science in the time of change to industrialization. Similarly later Hartmann 1838, columns 975-985 and 1017-1023. Also Karmarsch & Heeren

textiles, from which the paper is later made. It denotes the textile part of the genesis of the paper on which all later philosophy will be written and printed.

Campe's claim thus follows the notion of a decisive cut induced by the invention of industrial machines like the mechanical loom in 1825, which is exactly what Blumenberg rejects in his work. To him, the potential of industrial utilization is a late and secondary trait. "The characteristic of natural being, namely carrying the principle of its design and function in itself, is transposed consequentially to the field of the technical work."<sup>33</sup> In the word 'transposed' we may recognize the 'transfer' of the metaphor.

For Campe's claim, that Blumenberg sees metaphor as a question of technology, it does not matter if we see half-stuff as a textile semi-paper-product belonging to a long history of paper manufacture or as an exclusively industrial term. But it matters for the approach presented here that takes textile terms seriously. Usually, textiles are taken for granted and not considered important for the way we make things today not to mention the way we think about this making. Some further cases might show how this affects our reading of textiles and textile production.

### Outsourcing textiles from intellectual history

Pherecydes of Syros (6<sup>th</sup> century BCE) was one of the first to write down his ideas of the generation of the cosmos.<sup>34</sup> In his account (fr. 68 Schibli = DK 7 B2 = KRS 53), the god Zas (Zeus) weaves fabric representing the cosmos for Chthonie as a *geras*, a matrimonial gift.<sup>35</sup> Pherecydes, though writing his cosmology in prose, is not counted among the early cosmologists because weaving is taken as mythical content. Where the column drum of Anaximandros<sup>36</sup> might be addressed as a rational idea and the first scientific explanation of the cosmos, the loom of Zeus is taken as a myth or not mentioned at all.<sup>37</sup>

However in Pherecydes, weaving refers to the production of the cosmos and might well provide the technological backdrop of the question of how the cosmos is made and what its inner construction is like. Pherecydes, Anaximandros, the Pythagoreans and the atomists answer the same question, only the technologies are different: weaving, architecture, arithmetic and a behaviour of tiny particles (atoms). In this chapter, we object to the tradition that considers weaving as a mythical or metaphorical answer to the question of the order of cosmic composition.

The Pythagorean answer to the inner structure of the cosmos, namely to call it a harmony of numbers, might illustrate another outsourcing strategy: the distinction between pure and applied science. This can be traced back to a quote from Plato's *Statesman*, where knowledge is divided into disciplines such as arithmetic, which are "free from actions" (*psilai tōn praxeōn*) and "only provide insights" on one hand and, on the other hand, crafts such as carpentry, where the knowledge belongs to the action and together with it creates "bodily things" "that have not been there before" (258e). Unfortunately the young man named

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1843, under the entry "Papierfabrikation", 549-552, and 556-558. The English reference of this work is Ure 1840, where half-stuff is mentioned under "Paper, manufacture of", pp. 926 and 927. For the beginning of industrialized paper-production cf. Müller 1862, with several editions of which the ones from 1855, 1862 and 1877 since 2013 are available as Springer ebooks in the category of materials science.

<sup>33</sup> Blumenberg 2015, 29. In the original text: "Die Charakteristik des natürlichen Seins, daß es das Prinzip seiner Gestaltung und seiner Funktion in sich trägt, wird folgerichtig in den Bereich des technischen Werkes transponiert."

<sup>34</sup> For the tradition which makes Pherekydes the first Greek prose author see Schibli 1990, 2-4, who discusses the ancient sources (Theopompos *ap. D.L.* 1.116 and the *Suda*) also in relation to Anaximander's prose book. Previous account of divine genealogies (e.g. Hesiod's *Theogony*) were poetic ones.

<sup>35</sup> We cannot deal at length with this example here. Cf. Schibli 1990, Harlizius-Klück 2004, 155-161; Scheid & Svenbro 1990, 63-67. Still today we refer to marriage as establishing a sort of fabric: 'the holy bond of matrimony'.

<sup>36</sup> Cf. Kirk, Raven & Schofield 1983, 122.

<sup>37</sup> See for example Algra 2001.

Socrates, to whom these words are directed in the dialogue, is not especially proficient in mathematics and meets his limits already when classifying squares according to the commensurability of the diagonal (266a). Therefore the interlocutor has to take a detour in order to exemplify the ideal of political knowledge to the young man: the paradigm of weaving. The statesman has to connect the brave and the tempered in fitting marriages, like the weaver connects threads to form a harmonious whole fabric.

Plato does not miss the chance to downsize the value of weaving. He says, you might as well, if nothing else is at hand, take “a quite minor example” (279a) like weaving, in order to correctly present what is to be recognized. He repeats this precaution doing his analysis of the presented example, saying: “No one in his right mind would ever consider the explanation of weaving for its own sake” (285d).

Descartes too, as already mentioned, is concerned with the distinction of proper reasoning and practical experience. Rule 10 of his famous rules for the direction of the mind states: “In order to acquire discernment we should exercise our intelligence by investigating what others have already discovered, and methodically survey even the most insignificant products of human skill, especially those which display or presuppose order”. Descartes prides himself of being born with an *ingenium* that finds evidence by its own means and needs no such detours. But he has to confess: “Still, since not all minds have such natural disposition to puzzle things out by their own exertions, the message of this Rule is that he must not take up the more difficult and arduous issues immediately, but must first tackle the simplest and least exalted arts, and especially those in which order prevails – such as weaving and carpet-making, or the more feminine arts of embroidery, in which threads are interwoven in an infinitely varied pattern. Number-games and any games involving arithmetic, and the like, belong here. It is surprising how much all these activities exercise our minds, provided of course we discovered them from ourselves and not from others.”<sup>38</sup>

Scheid and Svenbro cannot be accused of having outsourced weaving from the scholarly discussion in *The craft of Zeus*.<sup>39</sup> On the contrary: their impact on a serious investigation of weaving allusions in ancient texts cannot be underestimated. They call Plato’s weaving paradigm “the philosophical exegesis of ritual weaving”<sup>40</sup> that is accompanied by or based on a myth expressed in a philosophical context.<sup>41</sup> Myth here means a shared metaphor, a common knowledge, a figure of thought used by an entire civilization “without ever becoming fixed or dead”.<sup>42</sup> Such a myth is thus generating stories and images, rituals and exegesis.<sup>43</sup> Scheid and Svenbro conclude that “the fundamental gesture of weaving is this interlacing of the warp and the woof of which Plato spoke in *The Statesman*—an interweaving signifying the union of opposites”.<sup>44</sup>

Scheid and Svenbro ground their investigation on “this clear gesture”: “To weave is to unite, to interlace, to bind: the act is so straightforward that it requires no explanation.” But already the statement that weaving thus is unlike sacrifice in which “to divide is to unite”<sup>45</sup> shows the main problem of such an approach. Was it not Plato who called the shuttle an instrument of separation?<sup>46</sup> And is there not a huge discussion about the translation of *kerkis* as shuttle in this passage, because it is not at all clear to us what using a *kerkis* (*kerkizein*) means?<sup>47</sup>

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<sup>38</sup> Descartes 1985, 35.

<sup>39</sup> Scheid and Svenbro 1996. The French book is entitled *Le métier de Zeus* - with the double meaning of *métier*: craft and loom. Thus the title alludes to the fragment of Pherecydes mentioned earlier in this chapter.

<sup>40</sup> Scheid & Svenbro 1996, 31.

<sup>41</sup> Scheid & Svenbro 1996, 22.

<sup>42</sup> Scheid & Svenbro 1996, 2.

<sup>43</sup> Scheid & Svenbro 1996, 4.

<sup>44</sup> Scheid & Svenbro 1996, 5.

<sup>45</sup> Scheid & Svenbro 1996, 10.

<sup>46</sup> *Cratylus* 436b.

<sup>47</sup> For a discussion of the passage see Ademollo 2011, 107-117 and Barber 1992, 273-274.

We think that Plato actually far exceeds a mythographical exegesis and does not interpret the metaphor of a woven state. Instead, he describes a technological approach that he later addresses to the king as a valuable and necessary knowledge. Plato is interested in the genesis of the textile whereas Scheid and Svenbro concentrate on the product.

The guiding questions of our investigation follow the ideas outlined in this methodological introduction. To what question does the weaving allusion give an answer or provide a context or backdrop? What are the characteristics of the answer, not in terms of a common knowledge but in terms of the coeval technological knowledge? What happens to the allusion to weaving when we interpret it in terms of the principles of ancient weaving technology? And what is the idea behind intellectual production when it is compared with textile production?

### Differences in weaving technology

A consequence of our diagnosis of textiles and weaving being taken for granted is to unsettle this assumption first and provide an overview of the specific technological and structural features of ancient weaving.<sup>48</sup>

We need to avoid discussing ancient sources with modern concepts and terms of textile technology in mind. The construction of a weave, at least since medieval times, differs considerably from that of antiquity. Furthermore, the general understanding of the development of weaving technology leads to the misconception that fabrics made on primitive devices must have been primitive themselves. However, the advantage of industrial looms is mainly an increase of speed and automation, and not necessarily an increase in complexity of the fabric produced.

Blümner, in his comprehensive overview of ancient crafts, argued that the weave shown on the loom behind Penelope on the Chiusi skyphos (fig. 1)<sup>49</sup> could never have been woven on the depicted warp-weighted loom, which is far too primitive for such an elaborate work. The fabric must therefore have been embroidery.<sup>50</sup> Such an explanation has a long tradition, in which patterned textiles, *poikilia/poikilma*, that are so frequently mentioned in ancient sources or depicted on vases, are conceived as embroidery. This makes them a superficial decoration. A deeper structural analysis is then obsolete and cannot contribute to the meaning of weaving metaphors.

However, in 1948, Wace presented a study that explains why in almost all cases where the verb *poikillō* is used to specify a patterned textile, it must be translated, not by embroidery but weaving.<sup>51</sup> The fact that needle and thread belong to the tools of the *poikiltai* (the persons who produce patterned fabrics)<sup>52</sup> is no argument against weaving that is often done with needles or pointed instruments, especially tapestry.<sup>53</sup>

Gregory Nagy, when juxtaposing weaving and sewing imagery in archaic Greek poetry, states that “the second of the two is more complex than the first”. Therefore, in the language of poets, many and various fabrics of songs, each one already woven, become a single new continuous fabric “by being sewn together”.<sup>54</sup> In fact, we will show that weaving in archaic

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<sup>48</sup> But we not only point to the differences. Still nowadays weaving has properties in common with the ancient technology, especially the dualistic character to which Scheid and Svenbro refer as opposites.

<sup>49</sup> Skyphos, ca. 440 BCE, Chiusi, Museo Archaeologico Nazionale 1831. Fig. 1 shows a drawing from Furtwängler and Reichhold 1921, pl.142.

<sup>50</sup> Cf. Blümner 1912, 158.

<sup>51</sup> Cf. Wace 1948. See also Barber 1991, 359-365.

<sup>52</sup> Cf. Aeschines, *Against Timarchos* 97.

<sup>53</sup> For a comprehensive discussion on this question cf. Droß-Krüpe and Paetz gen. Schieck 2015.

<sup>54</sup> Cf. Nagy 1996, 65-66, with special reference to the poetics of *rhapsōidein* in the performance context of the rhapsodic contest. Nagy focuses on the rhapsodic *agōn* at the Panathenaic festival in Athens: there the *rhapsōidoi* recited the Homeric epics in a fixed sequence, one taking up the narrative where the previous had left it (see also Nagy 2002, 42-46 with references to epigraphic and scholiographic sources, esp. Σ Pind. *N*).



times was far more complex than sewing and much better suited to integrate different types of fabric into a unified whole (see also fig. 8).

Weaving terms are usually approached on the basis of the garments we wear, the way we wear them and the way they are made today. Cloth is associated with a textile produced and traded in considerable length, then cut and sewn into shape. Such textiles have a neat outer side and rarely seen inner side. Their cut follows the shape of our body. We enter our clothes by putting head, legs and arms into holes and tubes. We buy our clothes already made to shape and do not see them being constructed. We also do not see the technology behind the production of the fabrics. It is common for modern consumers to see textile production as a simple, lowbrow, undemanding, insipid activity we do not have to do ourselves. The current trend is to buy lots of cheap clothes and discard them quickly.<sup>55</sup> Acknowledging the complexity and effort of cloth production would give us an insight into the unfairness of the prices we usually pay.

In antiquity, garments were produced in almost every household; they were highly valuable and rarely cut and sewn. The most valuable ones were decorated while on the loom, woven into shape, and draped around the body. They had no inner and outer side and therefore designs could often be reversible. This might be the reason why painting and printing on fabrics is uncommon in antiquity, as preferred were those techniques with inverse, complementary or neat patterns on both sides. The shape of the garments does not follow the shape of the human body. It is not conceived as a second skin, and in draping such garments there are no holes or tubes to enter. In ancient times, textile production could be a task for highborn women and queens<sup>56</sup> and even stand symbolically for the fabric of a whole *polis* like in the case of the *peplos* woven and offered to Athena Polias on the occasion of the Great Panathenaia of Athens.<sup>57</sup>

However, the most important difference between modern and ancient weaving is the way in which weaving begins. Fabrics from the warp-weighted loom in use in ancient Greece are made by first weaving a starting border: a band that carries the warp threads for the fabric and remains attached to the fabric. In Roman times, this way of making a warp was called *ordior*, and all words for order stem from this root.

### **Description of ancient weaving on a warp-weighted loom**

In principle, weaving is the interlacing of two sets of yarn: a tensioned set of threads, set up first, constitutes the warp, while the threads introduced by interlacing constitute the weft. The device that provides the tension is the loom.<sup>58</sup> The two principal possibilities of tensioning the warp used in antiquity are to stretch the threads by weight or to stretch them between two beams. In the latter case the beams might be placed parallel to the ground, which has advantages for implements like heddles. The preferred loom type used in Greece was the warp-weighted loom, the one we see on archaic vase paintings.<sup>59</sup>

Before threads are attached to a loom to make a garment, many decisions have to be made to achieve the desired result: on yarn thickness, on quality and length, but also on details like the twist direction of yarn, the distribution of coloured threads, the number of threads

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2.2).

<sup>55</sup> The so-called 'Primark-effect' proves this: where the proportion of household waste sent to landfill in the UK decreased nearly by a quarter within five years up to 2008, in that time textile waste has risen from 7% to 30% of total waste. Cf. House of Commons 2010, Vol I, 20; Vol II, Ev154 and n. 8.

<sup>56</sup> Helen is weaving in the *Iliad* (3.125-27), Penelope in the *Odyssey* (2.94-95; 19.136-40). Girls from noble families start the weaving of the *peplos* for Athena at the *Chalkeia* in Athens (Burkert 1990, 40-59).

<sup>57</sup> Cf. Scheid & Svenbro 1996, 18-21.

<sup>58</sup> Cf. Barber 1991, 5.

<sup>59</sup> Cf. Skyphos from Chiusi (fig. 1), Plate from Cyprus, ca. 850-750 BCE, Collection of Antiquities, University of Bonn (Aspris 1996), Corinthian aryballos, ca. 600 BCE, Corinth Museum CP2038, and further examples collected in Hoffmann 1974, 297-307.

necessary to achieve certain patterns and complete pattern repetitions. The warp-weighted loom is set up with a defining feature that also allows and affords most constructive decisions to be made beforehand: the starting border. This is a band or cord that collects, orders, and distributes the later warp threads, which are fixed in the cord or band as a weft (figs 2 and 6).

### ***The starting border***

The starting border is a band with weft threads prolonged on one side and secured and ordered by chaining them in groups.<sup>60</sup> Techniques for producing the band can vary. Sometimes the threads for the later warp are inserted into cords that later surround the fabric. Many archaeological textile finds have tablet-woven borders. The fact that these borders often shared the structure of the overall weave and were not sewn onto the fabric started the investigation of this technique by textile scholars at the turn of the 20th century.<sup>61</sup> They concluded that the preparation tasks of sorting the wool, spinning threads of the right quality and spin direction, planning the integration of the tablet woven borders, and setting up the warp threads by producing a tablet woven starting border might have taken much more time than the weaving of the fabric itself.

### ***Setting up the loom***

The warp-weighted loom has two uprights with an upper horizontal cloth beam and a lower horizontal rod used for shedding. Once the starting border has the length that is required for the width of the later fabric, it will be attached to the upper beam of the loom. The weft threads of the band now serve as warp threads and are distributed and attached to the *kairos* and the *kanōn(es)*: the heddle rods.

In a tabby, one set of threads is laid in front of the lower rod (or *kairos*), the other half behind. Attaching loom weights provides the warp tension and leaning the loom against a wall at a slight angle produces a natural shed: the interval where the weft is introduced. A heddle rod to which the other half of the warp threads is tied, provides the countershed. In this form (with one heddle-rod) the loom is prepared for weaving tabby, but additional heddles make it possible to weave twills and satins.

### ***Weaving***

The range of possible techniques on the loom is wide, from simple tabby and twill to damask twills and other compound weaves like taqueté, but also tablet weaving, tapestry, flying needle, and brocades. In a tabby weave, the weft threads go over and under every second warp thread and the opposite way in the next row. It is the simplest form of a weave where every other warp thread is either attached to the single heddle rod (*kanōn*) or hanging in front of the bottom rod (*kairos*). Tabby therefore requires the threads to divide into odd and even numbered ones. The differentiation of odd and even, the division into back and front – this dualistic or dyadic principle of distinction is at the heart of the weaving process. To construct the weave, a weft thread is inserted into the shed that is formed by the distance of the *kairos* to the warp threads hanging vertically. Then the vertical threads are lifted towards the weaver by pulling the *kanōn* far enough to form the countershed where the next weft is inserted. Only this technique of alternation can produce a fabric, and the alternation of lifting and not-lifting the warp threads is as constitutive for the fabric as the alternation of thesis and arsis for poetry.

Regular alternation - + - + - + -, a structure that gives tabby, is the basic but not the only method of generating fabrics. Several variations are possible like twills + + - + - + - + +

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<sup>60</sup> For the setup and weaving on a warp-weighted loom cf. Barber 1991, 116-118, 129, 271-273, and the rich discussion in Edmunds 2012.

<sup>61</sup> Cf. Schinnerer 1895 as one of the first who published on sprang, tablet weaving, and nålebinding in archaeological finds.

- where the rule for the next row shifts by one thread: - + + - + + - + + - + +.<sup>62</sup> Twill weave has weft threads going over more than one warp thread with a translation of one or more threads in every row. Twill can also be made in several number combinations by changing the direction of translation like in diamond twill.

Weaves can be open, with a considerable and balanced distance of threads in warp and weft direction, or have threads packed closely with only warp or weft threads visible (warp- or weft-faced fabrics). Tapestry is a weft-faced technique where weft threads do not reach over the whole width of the fabric but only as far as the colour is needed for the motif.

### ***Patterning a fabric***

Patterns on a fabric can already result from how threads cross, even if these threads do not differ in colour. Damask weaves use the change of two twill weave structures to achieve images that are visible because of different shades and shadows created by the change of structure. Furthermore, carefully planned weave structures can be combined with different colour distributions and intertwine to create a visual pattern that is difficult for laymen to predict and appears like a wonder to see.<sup>63</sup>

Figured motifs on bands can be made by double-face tablet weaving (fig. 2). One of the less demanding techniques for inserting pictures in a weave on the loom is supplementary weft patterning<sup>64</sup> which uses an additional coloured weft thread that only shows where the design is meant to be but otherwise runs on the reverse side of the fabric. The fabric then shows complementary pictures on both sides.

Tapestry remains rare among textile finds in Greece, but the few we have demonstrate a highly developed craft.<sup>65</sup> Literary sources often mention figurative weaves<sup>66</sup> and vase paintings show figured garments (see figs. 1, 3, 4 and 7), the depiction of Penelope's web on the *skyphos* from Chiusi is among the most famous. In Homer's works, patterned cloaks called *diplax*<sup>67</sup> are mentioned, a word that is sometimes translated as 'double weave'. Double weave is made out of two warp and weft systems on one loom, producing two fabrics that exchange in order to produce a pattern (see fig. 2). It also has then the reverse pattern on the reverse side of the fabric as with supplementary weft patterning and double-faced tablet weave, a reversion that seems to be a favoured style in archaic times.<sup>68</sup>

### ***Composing a fabric***

The warp-weighted loom is a very flexible device. The weaves that are produced can be rearranged when in progress: it is possible to detach and rearrange the weights at any time, to change the direction of the warp, to change the heddles and the rhythm of warp-lifts, and to combine different types of weave.<sup>69</sup> Such a combination of different bands within one weave is unusual to us today. However, it may explain a literary epigram where several girls

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<sup>62</sup> For the similarity of weaving structures and meter in poetry cf. Nosch 2014, 94.

<sup>63</sup> Cf. Harlizius-Klück 2015b on the meander pattern depicted on a funeral plate by Exekias, figs. 45.5-45.9.

<sup>64</sup> Cf. Barber 139-40, 359 (footnote).

<sup>65</sup> For example the extraordinary tapestry from the tombs of Vergina, dated to the 4th century BCE, cf. Spantidaki 2014, 37-38; or the trousers from Sappula, cf. Wagner *et al.* 2009.

<sup>66</sup> Cf. Homer, *Iliad* 3.125-27; Ovid, *Metamorphoses* 6.53-82.

<sup>67</sup> *Iliad* 3.126; 10.133; 22.441; *Odyssey* 19.226; 19.242.

<sup>68</sup> The effect of reverse design that comes naturally with this weaving technique also came up in bilingual vase painting where the black figured and the red figured technology meet on one vase. For these vases the question has been posed how it was possible to design the same motif in reverse on both sides as the artists can never see both sides at once (cf. Cohen 2006, 29). This pottery technique is difficult to master and only occurs within a limited time span. In weaving, however, the reverse double depiction is an immediate result of the weaving technology and produced in one go (cf. Harlizius-Klück 2016, forthcoming).

<sup>69</sup> This was crucial especially for Ellen Harlizius-Klück's reconstruction for the Chiusi fabric (cf. fig. 2), where the weft threads of the short and narrow starting band are also the warp threads of the figured band, but in respect to the whole weave, they run again in weft direction. Cf. Harlizius-Klück 2015a.

weave hems for a fabric - and these are probably starting borders or vertical continuations on the selvage. The poem, by Antipater of Sidon (AP 6.287), reads:

Artemis, fairest of virgins, sovereign lady of women  
We three wove (*hyphēnametha*) this border (*pezan*) for thee.  
Bitie wrought (*kame*) the dancing girls  
And the crooked stream of winding Maeander.  
Blonde Antianira devised the decoration (*kosmos*)  
That lies on the left side of the river,  
And Bittion that on the right,  
Measuring a span and a palm.<sup>70</sup>

### Principles of ancient weaving

From the description of weaving on a warp-weighted loom we wish to stress three main concepts: 1) the ordered beginning or ordering border, 2) the dyadic structure and 3) the (ordered) composition of elements.

#### *The ruling border or (b)order as beginning*

The starting band or border is the most distinct feature of this type of weaving and probably evoked analogies of weaving with plotting and planning.<sup>71</sup> It provides the preliminary operation of ordering a textile by a band that predicts the measure, and often the quality, density, and the numbers of warp threads for the whole weave. Consideration for fitting patterns therefore begins with the starting border. At this stage two main choices must be correct: the distribution of colours and the divisibility of the total number of warp threads. If the latter were a prime number, no pattern repeat would ever fit. Knowledge of divisibility rules and number features such as odd, even, prime, relatively prime and knowledge of least common multiples and greatest common divisors was necessary to weave the elaborate patterns we see in the visual representations.

#### *Dyadic structure*

Another concept implied in the starting border is the dyadic structure that not only applies to the difference of warp and weft, but also of odd and even numbered warp threads.<sup>72</sup> This enables an easy distribution of the threads on the heddle rods – the *kairos* and *kanōn*. In the case of complex textiles, this pre-order by the band might involve arithmetical classifications that are much more complex.<sup>73</sup>

The dyadic arithmetic that is grounded on just these features of odd and even and handed down to us in Euclid's *Elements*<sup>74</sup> is traced back to the Pythagoreans, who thought that the universe was fitted together (*arariskō*) by harmonies of integers.<sup>75</sup> Becker, in his investigations of Pythagorean arithmetic, repeatedly stressed that the concept of number in ancient Greece resembled a pattern, a structure of elements, a texture, and that this textural aspect was the basis of the Pythagorean idea of the relationship or even kinship of things and numbers.

“What is called ‘number’ (*arithmos*) here obviously is a ‘counted number’, i.e. something counted or countable, to be precise: a multitude or texture of discrete (not continuous) sort that may be described by one or more numbers. [...] One should remember the etymology of the word ‘*arithmos*’ that stems from ‘*ararisko*’, ‘I join’,

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<sup>70</sup> Text and translation: W.R. Paton 1916 (Loeb).

<sup>71</sup> Cf. Nosch 2014, 93.

<sup>72</sup> Cf. Tegel in Rosenfeld 1958, 12; also Hoffmann 1974, fig. 69, p. 153.

<sup>73</sup> Cf. Rosenfeld 1958, 149-171.

<sup>74</sup> Books VII and IX of the *Elements* contain parts of an ancient arithmetic that is called theory of even and odd. Cf. Heath 1908; see also Harlizius-Klück 2004, 47-64.

<sup>75</sup> Cf. Kirk, Raven & Schofield 1983, 427, 428.

and indeed in its original sense means ‘fugue’ (‘Gefüge’). A sense for this tangible patterned character, for this structure of the primordial number that is not applicable to anything and everything, but sticks to certain objects, is still alive in Aristotle. How much more with the Pythagoreans and also Plato! Beginning with this tangible, primordial, if you like primitive number concept, the Pythagorean thesis is much more understandable. ‘Number’ denotes something like a particular arithmetically describable structure inherent in things and constituting their proper nature. However, this ‘structure’ according to the Pythagoreans is not an arrangement of something else which is a proper reality, but an autonomous framework that carries the things or, so to say, keeps them together from inside.<sup>76</sup>

And Becker goes on saying that “mathematical structures thus only become particularly mathematical ones insofar as this structure of things is prescinded, isolated, and detached from its original context as soon as the observing person is mathematician; a detachment that is explicitly called ἀφαίρεσις, *abstractio*.”<sup>77</sup>

Dyadic arithmetic was not part of the common everyday practice of architecture, astronomy, nor mercantile counting. The concrete value of integers is absent, and arguments concerning geometrical magnitudes “are expressed in the language of ratio and proportion, without assuming any numerical values”.<sup>78</sup> To distinguish numbers as odd or even and explore the properties that are generated by combining them<sup>79</sup> is not a very demanding task for a mathematician, but finding numbers of threads that satisfy such required conditions is exactly what the weaver does when s/he plans the pattern. Textile craft is hardly ever considered in the works of historians of mathematics<sup>80</sup> and other crafts that require such a type of arithmetic are not at hand. Therefore historians instead argue that dyadic arithmetic was an invention serving as argument in philosophy and providing a logical classification method.<sup>81</sup>

Mathematically it is possible and satisfying to attribute such abstract features as odd or even to a “concern with the generality of proof”.<sup>82</sup> However, we propose to relate this way of thinking about numbers to a practice that is itself concerned with generality, though not with the generality of mathematics, but rather the practice of setting up a loom for weaving patterns. Some mathematical terms still show that threads and loom parts were connected to practices of measuring and ruling. The word ‘line’ shows its origin from the ‘linen’ thread via Greek *linon* and Latin *linum*. *Radius* was the Latin word for the shuttle, later also denoting the compasses. The weaver is constructing figures with *radius* and *regula*, just like the geometrician with compass and straightedge. *Regula*, the ruler or straightedge, *kanōn* in Greek, denotes the heddle-rod that controls the regular repeat of the pattern.

### ***Ordered composition of elements***

Woven ornaments are not just a question of filling frames, but a question of ordering the elements or atoms of the weave, namely the threads. Every geometric motif has to be transformed into a ratio of thread numbers that are positive integers. The tools for the construction of repeats fitting into the frame provided by the starting border are the least common multiple, the greatest common divisor, and especially all theorems on divisibility

<sup>76</sup> Becker 1959, 9; cf. Becker 1963, 136. Translation by Ellen Harlizius-Klück.

<sup>77</sup> Cf. Becker 1963, 137, translation Ellen Harlizius-Klück.

<sup>78</sup> Saito 2009, 804.

<sup>79</sup> Cf. Heath 1908, *Elements* book 7 and 9.

<sup>80</sup> This is changing since ethnomathematics established itself and the analysis of Peruvian *kipus* showed that, at least in some non-European societies, textile structures are strongly connected to mathematics. See Urton 1997 and Brezine 2009.

<sup>81</sup> See Harlizius-Klück 2004, 54.

<sup>82</sup> Saito 2009, 805.

that we find in dyadic arithmetic. The so-called Euclidean algorithm is the way in which weavers would test the repeatability of a pattern in a fabric to weave. Because of the structure of weaves, geometrical problems have to be solved by arithmetical consideration, and the separation of proportion theory into a geometrical and an arithmetical one might have its origin here. Woven geometry is, so to speak, a tacit visual algebra.

### Figured friezes and doubled squares

When we see complex fabrics like the ones on the François Vase (fig 3, 4 and 7) we now know that the woven parts need not be sewn together but can be integrated on the loom.<sup>83</sup> The krater shows not only plain fabrics and figured friezes as fabric decoration, but also patterns based on a repeating diagram with a square in a square (fig. 4).<sup>84</sup> The basic outline of this diagram (fig. 5) can be easily explained as a depiction of broken diamond twill, a pattern that is not difficult to weave and the frequency of its occurrence on vase paintings would testify to this.<sup>85</sup>

What makes this diagram interesting for our discussion is not the question how it was made, but the fact that it poses special problems for the practices of counting and measuring and hence for the development of ancient mathematics. It is the diagram which Plato used in his famous ‘lesson on geometry’<sup>86</sup> and which underlies the important proof of the incommensurability of side and diagonal in a square<sup>87</sup> (a proof which is deemed to be at the beginning of deductive mathematics); the diagram that Plato/Socrates employs when he wants to test his interlocutor’s ability of philosophical thinking, for example in the *Statesman* dialogue,<sup>88</sup> well-known for the central role played by the weaving paradigm. Incommensurability in this diagram means that the relation between the length of the diagonal in the square and the length of its side cannot be expressed by integers (whole positive numbers). But if weaving means to construct a diagram from a countable number of elements, namely the threads, why can such a diagram be woven?

The way we have to look at such elaborately depicted patterns is determined by Socrates in the *Republic* as follows:

Then, said I, we must use the blazonry of the heavens as patterns (τῇ περὶ τὸν οὐρανὸν ποικιλία παραδείγμασι χρηστέον) to aid in the study of those realities, just as one would do who chanced upon diagrams drawn with special care and elaboration by Daedalus or some other craftsman or painter. For anyone acquainted with geometry who saw such designs would admit the beauty of the workmanship, but would think it absurd to examine them seriously in the expectation of finding in them the absolute truth with regard to equals or doubles or any other ratio.<sup>89</sup>

We think it is misleading to take this quote at face value. Plato’s *Statesman*, if we investigate the dialogue carefully, shows that the argument leading to the determination of the statesman’s knowledge builds upon the substitution of mathematics by weaving. In that dialogue Plato (respectively the Stranger as leader of the conversation) divides all sciences (*epistēmai*) into two classes: pure and applied (258c). To him, the arithmetic of odd and even numbers or dyadic arithmetic is pure, and craft is applied science (258d-e). In the dialogue,

<sup>83</sup> Barber suggested that figured friezes were made in tapestry technique and this indicates that the whole fabric is tapestry. Cf. Barber 1992, 360-65 for a detailed discussion of figured cloth in ancient Greece. Ellen Harlizius-Klück’s experience, moreover, is that combination with tablet weaving and other band weaving techniques is possible and often also suitable for figurative weaves.

<sup>84</sup> See the peplos of the dancing girl on the left of fig. 4.

<sup>85</sup> Another famous example is the *peplos* of Athena on a bilingual amphora by Andokides, ca. 520-510 BCE, Collection of antiquities, Munich, 2301.

<sup>86</sup> *Men.* 82a-85b.

<sup>87</sup> Cf. Heath 1908, Vol. III, Introductory note on Book X, p. 2.

<sup>88</sup> *Statesman* 266a-b.

<sup>89</sup> Cf. *Republic* 529d-530a (quoted from *Plato in Twelve Volumes*, Vols. 5 and 6 translated by P. Shorey. Cambridge 1969).

a nameless stranger from Elea is talking with a young man called Socrates and tries to describe the *epistēmē*, the science, knowledge, or art of a true statesman. It turns out that the statesman has to compose a state by “royal weaving” (310e) that connects the citizens harmoniously.

It is hardly ever noticed that weaving serves here as a replacement for a pure science that goes beyond the understanding of the young man who is involved in the dialectical conversation: Socrates (not the philosopher, who instead listens to this conversation without interrupting) is asked to classify living beings by comparing the number of their feet (two or four) to the ratio of diagonal and area of a two-foot-square or a four-foot-square (266a-b). The crucial point is to test Young Socrates’ knowledge of incommensurable quantities and the way in which they can be related. Doubled squares are the best examples for incommensurable relations: the ratio of side and diagonal cannot be expressed by a ratio of integers (which is incommensurability by definition). The Greeks called this ratio *alogos*, ‘unspeakable.’<sup>90</sup> The only possibility to describe it was to give a proportional equation: an *analogia*, which is the Greek mathematical term for such equations of ratios. The unspeakability of incommensurability can only be discussed by analogies and this mathematical knowledge on incommensurable quantities is what the young interlocutor fails to master.

The doubled square is used in the mathematical proof of incommensurability, which was handed down to us in the famous *Elements* of Euclid, written around 350 BCE.<sup>91</sup> It is a proof that is based on the definition of odd and even numbers in dyadic arithmetic, Plato’s example of pure science. Hence, the diagram of the doubled square we see so frequently depicted as a fabric pattern is at the heart of the revolution in Greek mathematics,<sup>92</sup> however no diagrams are presented in the ancient texts of Plato and probably also not in Euclid.<sup>93</sup> The first mathematical diagrams we know are from Aristotle.<sup>94</sup>

The diagram depicted on the aforementioned plate from Cyprus showing a patterned fabric on a warp-weighted loom is dated to ca. 850-750 BCE. As woven patterns, the depicted geometrical shapes are constructed by ratios of countable elements (the threads). If we take the date of the plate as *terminus ante quem*,<sup>95</sup> this construction predates the arithmetical and logical reasoning and proofing of the geometrical properties by almost 500 years. For such reasons weaving can truly be addressed as an intellectual activity prefiguring concepts of mathematical order.

### Technology into words

Turning into matters of early Greek literature, we set up to trace the ordering concept of the starting border as ‘embedded’ in key terms of archaic poetics. When looking at the semantics of such terms, their roots in textile technology seem to be reflected by two orders of factors: a) etymological derivation, with cases of popular etymology providing good evidence for the spread of certain conceptual associations, and b) the function they fulfil within the poem as both structural and performative principles.

In the scholarly debate to date, weaving imagery in ancient cosmogonies and the poetic exploitation of textile crafts as metaphors for the representation of man’s fate, human

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<sup>90</sup> Cf. Fritz 2004, 228-229.

<sup>91</sup> According to Heiberg, this proof is older and Euclid is not its author. It therefore does not occur in the English edition of Euclid’s text, but only in the introduction to book X by Heath; cf. Heath 1908, Vol. III, 2.

<sup>92</sup> Cf. Szabó 1978, 94.

<sup>93</sup> The oldest extant diagram stems from a manuscript found at Oxyrhynchus and was dated to 75-125 CE, cf. Turner 1987. Today the papyrus fragment is in the Museum of Archaeology and Anthropology, University of Pennsylvania, E2748.

<sup>94</sup> Cf. Harlizius-Klück 2004, 66.

<sup>95</sup> Cf. Aspris 1996, 4.

cunning intelligence,<sup>96</sup> and the process of song-making in archaic Greek literature, have been studied and interpreted either through a historical-anthropological approach, or with the tools of comparative linguistics. In a reference study on the topic, textile imagery has been traced back to the pervasiveness of the ‘myth of weaving’ as interlacement of opposites in Greek (and then Roman) culture.<sup>97</sup> With a different focus, it has been considered a linguistic and literary inheritance from the wider Indo-European substrate, where, within a rich repertoire of craftsmanship metaphors, it seems possible to account for a special significance of weaving and spinning imagery to describe poetic composition and the making of fate by the gods.<sup>98</sup> In a number of cases, in fact, a more attentive look at the material and technological facts at the root of textile metaphors featuring in archaic Greek literature provides satisfactorily explanations to obscure images,<sup>99</sup> and it can help explaining the semantic stretch which generates figurative, abstract meanings from words originally designating realities and implements of weaving.<sup>100</sup> As an instance of this, a number of adverbial expressions built on textile terms seem to point to the relevance of concepts of ancient textile technology in shaping and producing ideas of order and spatial/temporal relations.<sup>101</sup>

Onians’ rich discussion of πείραρ (plur. πείρατα) – which in LSJ<sup>9</sup> has the primary abstract meaning of ‘end’, ‘limit’, and a secondary material meaning of ‘tackle’, ‘rope’ – has outlined a major semantic value of the term, which is grounded on the materiality of textile crafts (binding, plaiting, spinning and weaving): the literal and concrete sense of ‘bond’ – and, depending on the context, ‘band’, ‘knot’, ‘rope’, ‘loop’, ‘boundary’, ‘edge’, ‘zone’, and even ‘weft threads’ – clearly emerges from a variety of passages that invite a literal, rather than

<sup>96</sup> Cf. Nicole Guilleux’s chapter in this volume. See as well Berggren 2008, 1-5 on the pre-Platonic tradition of transformative intelligence or *mētis* that is “fundamental to every *technē*” and connects the female art of weaving to language and the construction of truth. On the weaving of *mētis* as a narrative device in the *Odyssey*, see Slaktin 1996, 234-238. For the particular associations of *mētis*, weaving and feminine poetics in the *Odyssey* see Clayton 2004, 21-35.

<sup>97</sup> See the methodological remarks in the introductory chapter in Scheid & Svenbro 1996, 1-5 on their use of the concept of ‘myth’ (rather than ‘metaphor’) as a “figure of thought” (p. 2).

<sup>98</sup> Durante 1976, 173-179 gives a systematic account of weaving and spinning terminology and imagery for poetic creation in Indo-European languages. More recently see West 2007, 35-38. Onians 1951, 303-351 exhaustively treats Greek evidences for the image of the spinning, weaving and binding of human fate. On Indo-Iranic cosmic weaving and on the origin of the imagery of the thread of life see Andrés-Toledo 2010, 33-58, 65-75.

<sup>99</sup> Onians 1951, 303-309 is able to explain the phrase, recurrent in Homer, that the fate of man (and many other kinds of issues), ‘lies on the knees of the gods’ (θεῶν ἐν γούνασι κεῖται) by looking at the ancient method of spinning where part of the process was done on the knees while sitting; the phrase occurs at *Il.* 17.514, 20.435 and *Od.* 1.267, 400, 16.29.

<sup>100</sup> In a book-length discussion of syllepsis in Pindar, Gallet 1990 has argued for the original identity of the abstract term καῖρός (‘due measure’, ‘critical time’, ‘opportunity’) and the weaving implement καῖρος (which he identifies with the ‘chained spacing-cord’, according to the definition by Hoffman 1974, a device which keeps separated the even and odd threads of the warp and is located on the lower part of the warp-weighted loom), and applied this insight to a number of passages in epinician odes where καῖρός conveys important statements of poetics: it emerges that the abstract term, which derives its conceptual domain from the function performed by the καῖρος, expresses the orderly interlacing of themes within the structure of the Pindaric poem. The semantic stretch from a material, textile related meaning to an abstract one for the term καῖρος/καῖρός was first proposed by Onians 1951, 343-348, who identified καῖρος with the opening (‘shed’) produced by the heddles in the warp.

<sup>101</sup> While expressions such as κατὰ μίτον (lit. ‘thread by thread’, fig. ‘in due order’) point both to the subtlety of an argument and to the unbroken sequence of facts in a historical narration (cf. e.g. Pherecr. 156.7 *PCG* and Plb. 3.32.3, on which see Durante 1976, 174), the case of adverbial phrases built on *kairos* (e.g. ἐς καῖρόν, κατὰ καῖρόν, πρὸς καῖρόν ‘at the right time’, see LSJ<sup>9</sup> s.v. III b.) draws on the term’s traditional usage in the sense of ‘critical time, opportunity’, developing from the spatial sense of ‘due measure, proportion’ (see Ford 2002, 16-22 on *kairos* as a key concept of archaic poetics and aesthetics, indicating appropriateness).



an abstract or metaphorical, reading.<sup>102</sup> The meaning of ‘weft threads’ is by Onians attributed to *peirata* in a passage whose literal meaning has troubled interpreters. In Pindar’s first *Pythian* (81-82), a gnomic sentence on epinician poetics opens the fifth strophe:

καιρὸν εἰ φθέγξαιο, πολλῶν πείρατα συντανύσαις  
ἐν βραχεῖ, μείων ἔπεται μῶμος ἀνθρώ-  
πων·

If you should speak according to (the function of) the  
καῖρος, keeping many weft-threads  
in tension in a short length (of warp) [or (fig.) ‘with the  
texture of your speech tirlightly-woven’],  
less criticism follows from men.

The occurrence of both *kairos* and *peirata*, and the fact that the latter is the object of the *hapax* συντανύω (“to stretch so as to join together”),<sup>103</sup> which points allusively to the Homeric τανύω (in turn used in a description of weaving in *Il.* 23.761), invites a literal and ‘textile-based’ interpretation of these lines. This adds a subtler layer to the obvious figurative meaning of the *gnomē* (“if you should speak to the point by combining the strands of many things in brief”).<sup>104</sup>

When considering the attestations of the term, we propose to think of *peirar* as a starting border spanned out at the upper beam of a warp-weighted loom with the loops of warp threads integrated and the warp threads distributed alternately in front or behind the shed bar or *kairos* (fig. 6).<sup>105</sup> This would in turn help explaining the similar semantic stretch of Latin *ora* as both ‘cord’ and ‘edge’.<sup>106</sup> The starting border can be just such a cord that in the end of the weaving process surrounds the whole weave. In between, using the heddles in order to provide the shed for the weave, the warp ends that are part of the band as weft loops cross over again and again. The two systems of threads spread out from, and are alternately ordered and tensioned by, the starting band. (fig. 6).

In the remainder of this chapter we will argue (first) that the structural pattern of borders as an ordering principle invests early Greek views of an ordered *kosmos* surrounded by encircling bands/bonds; (second) that the poetic artefact is similarly conceived of as an ordered *kosmos* of words (though not necessarily in terms of textile imagery: cross-craft metaphors seem to play a role here); (third) that the poem, as mirror image of the physical *kosmos*, is in turn framed by borders, which take the shape of ring-structures; finally, that the semantics of a few key terms of archaic poetics, and their phenomenology and function are grounded in the technological principle of the starting border of the weave.

<sup>102</sup> Cf. Onians 1951, 310-17. In a monograph entirely devoted to the term, Bergren 1975, 153 proposes as the concrete meaning of πείρατα ‘boundary lines’, and ‘determinants’ as the abstract; for a detailed criticism of Onians’ investigation of πείρατα see Bergren 1975, 170-180.

<sup>103</sup> This meaning of the verb is suggested by Bergren 1975, 153.

<sup>104</sup> Translation in brackets: Race 1997 (Loeb) modified. Onians 1951, 338-340 discusses briefly the passage. Bergren 1975, 148-162 and Gallet 1990, 103-115 offer rich and thorough discussions of this *gnome* and of the implication of Pindar’s statement of poetics within the structure of *Pythian* 1. Interestingly, the weaving connotation of πολλῶν πείρατα συντανύσαις ἐν βραχεῖ had already been noted by the scholiast (157b Drachmann): ἡ δὲ μεταφορὰ ἀπὸ τῶν δικτύων (“the metaphor is taken from the nets”).

<sup>105</sup> That the meaning of ‘starting border’ can encompass occurrences, like the passage from the first *Pythian*, when πείρατα/πείρατα designate ‘weft threads’ is a consequence of an important technological principle of the starting border: this, being a border/band, always includes the weft threads.

<sup>106</sup> Cf. Onians 1951, 317.

### From cosmology to poetics: earth-encircling bands and the ‘kosmos of words’

To investigate the role that weaving technology seems to play in providing a model for cosmological structure we need to recall *πεῖραρ/πεῖρας*.<sup>107</sup> In particular, we shall refer to occurrences of the term that attest to the significance of the idea of cosmological (and therefore physical) bonds and bands encircling the universe;<sup>108</sup> to the same semantic constellation of *πεῖραρ/πεῖρας* we would refer in turn the conception of the ‘binding’ of the gods.<sup>109</sup>

When looking at different cosmological conceptions such as, among the Presocratic philosophers, Parmenides’ and the Atomists’ (Leucippus and Democritus),<sup>110</sup> what strikes one is the recurrent image of something encircling and enveloping the cosmos – in a fashion which seems to suggest an analogy with the function of the ordering border in weaving. In the poem of Parmenides (28 B 8.26-31 DK = 298 KRS) we encounter again *πεῖραρ*, occurring twice in association with *δεσμοί* (‘bonds’) in a passage describing the conditions by which *ἐόν* (lit. ‘what is’) is unchangeable: it is said to be “immovable in *πεῖρατα* of huge bonds” (*ἀκίνητον μεγάλων ἐν πείρασι δεσμῶν*, 26) and held by “strong Necessity in bonds of the *πεῖραρ* which encloses it around” (*κρατερὴ γὰρ Ἀνάγκη πείρατος ἐν δεσμοῖσιν ἔχει, τό μιν ἀμφὶς ἔέργει*, 30-31).<sup>111</sup> The conception of the supreme power of Necessity, common to the Orphics and the Pythagoreans as well, is here associated with the idea of *peirata* binding the *kosmos*. It is thus tempting to establish a further relation, on the ground of textile terminology as a vehicle of cosmological realities, with Plato’s image of the spindle of Necessity (*Ἀνάγκης ἄτρακτος*, *Rep.* 616c).<sup>112</sup>

<sup>107</sup> The relationship between the two forms of the term is generally considered a diachronic one, *πεῖραρ* being the older (mainly Homeric) form.

<sup>108</sup> An instance of such a view emerges in the widely-spread image of Okeanos as a river surrounding the earth (evidences from Homer, Hesiod, the Orphic hymns and later authors are collected in Onians 1951, 315-317 and Kirk, Raven & Schofield 1983, 10-17). See e.g. Hom. *Il.* 14.200-201 *εἴμι γὰρ ὀψομένη πολυφόρβου πείρατα γαίης / Ὠκεανόν τε, θεῶν γένεσιν, καὶ μητέρα Τηθύν* (“For I am going to visit the bonds of the all-nurturing earth, and Oceanus, from whom the gods are sprung, and mother Tethys”), where Okeanos and his wife Tethys “are clearly conceived of not as parts of the earth but as distinct beings encircling it” (Onians 1951, 316). Text and translation of Homer (here modified as to account for the material meaning of *πεῖρατα*) used in this chapter is taken from the Loeb edition: for the *Iliad*, translation by A.T. Murray, revised by W.F. Wyatt (1924 *Il.* 1-12, 1925 *Il.* 13-24); for the *Odyssey*, translation by A.T. Murray, revised by G.E. Dimock (1919 *Od.* 1-12, 1919 *Od.* 13-24).

<sup>109</sup> Which Onians 1951, 331 sees as “a literal description of an actual process, their mode of imposing fate upon mortals, a religious belief and not a metaphor”: this seems to force the evidence, and we would rather endorse the more balanced view offered by Lloyd 1966, 192-193, who remarks that “[T]he spinning, weaving and binding of the fates is a fiction or a myth in the sense that it is imagery, even if it was anything but fictitious in the sense of false for the ancient Greeks who were convinced, or assumed, that this was indeed the way in which fate worked.” Onians proposes for the formulaic phrase (*τινὶ ὀλέθρου πείρατ’ ἐφέπται*) (usually interpreted as “the ending/consummation of death is hung over someone”) a reading of *peirata* as ‘bonds’ or ‘bands’ of fate fastened upon someone, just like in the case of the *peirata* that bind Odysseus to the mast in *Od.* 12.51 (here the verb is another compound of *ἄπτω*, *ἀνάπτω*). While *πεῖραρ/πεῖρατα* is always qualified by a genitive often indicating ‘ruin’ or ‘misery’, these very words (*ὀλέθρος* and *οἰζύς*) appear as objects in the formulaic Homeric phrase for the gods’ spinning of men’s fate (*θεοὶ ἐπλέκωσαν*): Onians points this out so as to suggest that *πεῖραρ* itself indicates a product of spinning, and that “the same fortunes which the gods spin for men, they also fasten upon them in the form of a cord or bond” (p. 335).

<sup>110</sup> For a recent overview on the question of the relative chronology of Leucippus and Democritus, and their respective contribution to the atomic theory (in both ancient doxographic accounts and modern scholarship) see Graham 2008, 333-352.

<sup>111</sup> Translation Onians 1951, 332 modified.

<sup>112</sup> Here we are drawing on Onians 1951, 332, who does not include the Atomists in his discussion. Interestingly, the *πεῖρατα* of Parmenides’ 28 B 8.26-31 DK are taken as metaphors by Kirk, Raven & Schofield 1983, 253-254, who translate the term as ‘limit’ and note that “[T]he notion of *limit* Parmenides is employing here is obscure”. Tarán 1965, 115-118 discusses the occurrences of *πεῖρας/πεῖρατα* in fragment 8 (13-15, 26-27, 30-31, 37-38, 42-43, 49) as being metaphorical rather than referring to a material reality. Mourelatos 1970, 26-29 sees in Parmenides’ use of *πεῖρας*, which he interprets (after Onians) as referring to the ideas of ‘bond’,

In two different accounts of the Atomists' conception of the formation of worlds through atomic conglomerates<sup>113</sup> – where the isolated atoms form a vortex, become entangled, and make a spherical structure – it is reported that a membrane (ὑμήν) or, alternatively, a circular χιτών ('cloak') encloses the atomic congregation forming a *kosmos*.

Λεύκιππος καὶ Δημόκριτος 'χιτῶνα' κύκλῳ καὶ 'ὑμένα' περιτείνουσι  
τῷ κόσμῳ διὰ τῶν ἀγκιστροειδῶν ἀτόμων συμπεπλεγμένον.

Leucippus and Democritus envelop the *kosmos* in a circular *chitōn* or membrane, which was formed by the hooked atoms becoming entangled.<sup>114</sup> (Aetius 2.7.2 = 564 KRS)

The idea of *kosmos* as a structure ordered by encircling textiles finds application not only in regards to the complex and harmonious arrangement of elements that constitutes the physical world. Poetry is similarly conceived of as a *kosmos epeōn* ('*kosmos* of words'), an elaborated verbal construction that is the result of highly-developed technical skills and that displays in its inner structure unity, coherence and proportion. Such a view of poetic 'composition-and-performance' as craft has been positioned within the archaic Greek view of poetic activity as *mimesis*: poetry-making is seen as an imitation of nature, human life and previous poetic models.<sup>115</sup> A brief survey of the relevant passages and their contexts will help ground our discussion of a further aspect conveyed by the term and concept of *kosmos* in both cosmological accounts and archaic poetics.<sup>116</sup>

Given that it is among 5<sup>th</sup> century BCE thinkers that we find the conception of *kosmos* as an orderly structured world,<sup>117</sup> it is probably no coincidence that Parmenides and Democritus are among our sources for the *kosmos epeōn* phrase.

When the unnamed goddess of Parmenides' poem has completed her discourse on truth (ἐν τῷ σοι παύω πιστὸν λόγον ἥδὲ νόημα / ἀμφὶς ἀληθείης 28 B8.51 DK),<sup>118</sup> she introduced her subsequent cosmological account as informed by δόξα βροτεῖα ('mortal opinion').

(...) δόξας δ' ἀπὸ τοῦδε βροτείας  
μάνθανε κόσμον ἐμῶν ἐπέων ἀπατηλὸν ἀκούων.

henceforth learn the beliefs of mortal men, listening to the  
deceitful *kosmos* of my words (28 B8.51-52 DK)

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'band', 'bound(s)' usually associated with the Fate and Ἀνάγκη, a peculiar characteristic of "Parmenides' polymorph deity", and he concludes that (p. 28) "[I]t is probably correct to visualize the polymorph deity as engaged in "binding" with every occurrence of the word *πεῖρας* in the text."

<sup>113</sup> Diogenes Laertius 9.31 = 67 A1 DK = 563 KRS; Aetius 2.7.2 = 564 KRS.

<sup>114</sup> The English translation of the fragments of the Presocratics are adapted from Kirk, Raven & Schofield 1983. It is interesting to note that the final participle *συμπεπλεγμένον* has a clear textile connotation, deriving from *σμπλέκω* which means 'to plait, interlace, weave together'.

<sup>115</sup> The 'poetics of *mimēsis*' as reflecting the concrete ways and processes of archaic poetic composition and performance has been theorized by Gentili 1990, 50-60.

<sup>116</sup> In surveying the few extant occurrences of *kosmos epeōn*, it will be apparent that the phrase aligns itself with formulations of archaic poetics that describe and conceptualize song in terms of craftsmanship; in this regard, no special association with weaving imagery emerges in the texts: in fact, it is the transferring of the idea of an ordered *kosmos* to the song/poem that interests us here.

<sup>117</sup> See Empedocles B 134 DK, Anaxagoras B 8 DK, Diogenes of Apollonia B 2 DK. Cf. Ford 2002, 169 n. 35, who hints at the possible Pythagorean origin of such an idea.

<sup>118</sup> "Here I end my trustworthy discourse and thought concerning truth".

The analogy between this *kosmos*, that we interpret as referring to the ordered structure of Parmenides' cosmological hexameters,<sup>119</sup> and *kosmos* as the ordering of the physical world, is marked in the poem by the compound term *diakosmos* (l. 60). This word moreover indicates the balanced arrangement of the two fundamental cosmic forms (μορφαί l. 53), 'light' and 'night', from which all other things derive.

The verbal richness and unity of Homer's poetry are referred to as *kosmos epeōn* in a statement by Democritus:

Ὅμηρος φύσεως λαχὼν θεαζούσης ἐπέων  
κόσμον ἐτεκτῆνατο παντοίων

Homer, having been endowed with a nature that was sensitive to divine influence, built up a harmonious construction (*kosmos*) of words of every kind.<sup>120</sup> (68 B 21 DK = Dio Chrysost. *Orat.* 13.1)

The use of the verb τεκταίνομαι ('to build'), a clear reference to the craft of carpenters, suggests that Democritus' pronouncement on the orderly structure of Homeric poetry is in line with a further instance of the *kosmos epeōn*, one in which for the first time the difference between poetry and prose is explicitly stated.

Solon's elegy *Salamis* (fr. 1-3 W.<sup>2</sup>) opens with a bold statement by the poet in the first person, who addresses his Athenian audience:

Αὐτὸς κῆρυξ ἦλθον ἄφ' ἱμερτῆς Σαλαμῖνος  
κόσμον ἐπέων ᾠδὴν ἀντ' ἀγορῆς θέμενος.

I have come in person as a herald from lovely Salamis,  
composing a song, a *kosmos epeōn*, instead of a speech.<sup>121</sup>

It has been suggested that with κόσμος ἐπέων Solon emphasizes the ordered and regular sequence of metrical units that characterizes the elegiac metre (as well as other stichic recited verses like hexameters).<sup>122</sup> Because it points to facts of poetic structure in terms of regularity of orderly elements and metrical patterns, this explanation of the poetic '*kosmos* (made) of words' has interesting implications for the argument that we are trying to build in this chapter. By pursuing the model of weaving in early accounts of the structure of both physical

<sup>119</sup> For Parmenides' *kosmos epeōn* being 'deceitful' - *qua* a product of mortal opinion - see Kirk, Raven and Schofield 1983, 254; cf. also Mourelatos 1970, 226-227. Coxon 1986, 218 observes that "[T]he word (*sc.* κόσμος) is chosen for its aptness in relation to the διάκοσμος or 'system' which the 'composition' is to expound".

<sup>120</sup> English translation: Brancacci 2007, 201, who places Democritus' conception of the κόσμος ἐπέων in dialogue with Homer, Pindar, Parmenides and Solon (p. 203). Ford 2002, 169-170 has a fine discussion of this fragment, which he positions within what he calls Democritus' 'atomic poetics', arguing that the reference to *kosmos epeōn* points here to the ability of Homer as "word-creator, not poem-maker" (170); this interpretation works well in the context of Democritus' interests in matters of language, such as the construction of words through the combinations of syllables, or the explanation of Homeric 'glosses' (68 B 20a DK). However, for the present purposes we see Democritus' *kosmos epeōn* in continuity with other instances of the phrase indicating the ordered structure of a poem.

<sup>121</sup> The English translation of Solon is the most recent Loeb, by D.E. Gerber (1999).

<sup>122</sup> Noussia 2001, 229-231 and Noussia-Fantuzzi 2010, 211-212, who provides a rich commentary to these lines and discusses at length the features of Solon's *kosmos epeōn* which she understands as an "ordered sequence of words" (p. 212). Noussia points out that already in Homer we find *kosmos* in relation to the ordered structure of themes in a poetic performance: the adverbial phrase λίην κατὰ κόσμον "in exceedingly good order" (transl. Garvie 1994 *ad l.*) is referred to Demodocus' song (and its complex arrangement of narratives) in *Odyssey* 8.489-491. Demodocus' proto-kitharodic performance presents many interesting structural features: see the rich discussion in Nagy 2009, 313-349. In a chapter entitled 'A *kosmos* of words', Lewis 2006, 60-73 links κόσμος ἐπέων in Sol. 1-3 W.<sup>2</sup> to the ring structure of fr. 4 W.<sup>2</sup> in terms of patterns of thought.

and poetic *kosmos*, we look for concepts and patterns of ancient textile technology that are reflected at the level of structural features of archaic Greek poetry (arrangements of thematic sections, metrical patterns, performative sequences).

A fragment by Pindar (194 S-M), typically built on cross-craft imagery, offers an interesting variation on the *kosmos epeōn* phrase;<sup>123</sup> the poet describes the metapoetic erection of a ‘building of song’:

κεκρότῃται χρυσέα κρηπίς ἱεραῖσιν ἀοιδαῖς·  
εἷα τειχίζωμεν ἤδη ποικίλον  
κόσμον αὐδάεντα λόγων

A golden foundation has been wrought for holy songs.  
Come, let us now construct a variegated (*poikilon*)  
*kosmos* of words (*logōn*) that is endowed with speech.<sup>124</sup>

We have here a complex texture of images evoking architecture (τειχίζωμεν, κρηπίς), the art of smith (κεκρότῃται), sound (αὐδάεντα) and the technique designated by the adjective *poikilos*, which is often applied to the textile craft in Pindar.<sup>125</sup> The condition for composing a *kosmos* rests on the construction of the songs’ foundations, much like in the famous opening of *Olympian* 6:<sup>126</sup> the beginning as a starting front of the poem bears a special relevance to archaic Greek poetics, in which it is possible to outline the traits of a ‘proemial function’ investing both the performative realization and the compositional structure of the poem/song.<sup>127</sup> In this pattern of an ordering proem in poetry we recognize a declension of the weaving paradigm: at the level of ancient weaving technology, the beginning of the weave is the structural pattern ordering the whole of the fabric-to-be.

<sup>123</sup> A possible reason for the absence of *epeōn* here could be the fact that Pindar’s song is not made of ἔπεα (i.e. stichic verses), but rather of lyric unities and patterns.

<sup>124</sup> The English translation: Race 1997 (Loeb) adapted. In particular, in the interpretation of the last line we diverge from Race as for the syntactical construction, and take the adjective αὐδήεις as qualifying the *kosmos* of words as endowed with speech (for this meaning of the word see the Homeric passages collected in LSJ<sup>9</sup> s.v.). We thank Douglas Cairns for suggesting this interpretation of the line to us. For a metaperformative reading of this fragment, as a selfreferential utterance on the part of the chorus to their own performance, see Power 2011, 111: “[N]ot only the song, but the chorus and its performance itself should be understood as the κόσμος ‘adornment’ that is in the making before our eyes as well as ears. In other words, the chorus is notionally constructing *itself* through its very performance as an intricately crafted thing of beauty, a ποικίλος κόσμος, that yet has voice, an αὐδά”.

<sup>125</sup> See e.g. another fragment, 179 S-M: ὑφαίνω δ’ Ἀμυθαονίδασι ποικίλον / ἄνδημα (“I am weaving an elaborate (pattern woven) headband for the sons of Amythaon”), where ὑφαίνω seems in fact to replace πλέκω (‘plait’), another favourite textile craft in Pindar’s repertoire of metaliterary metaphors (see Gallet 1990, 77-82): we would like to thank Douglas Cairns for pointing this out to us. Nagy 2009, 554-555 argues for systematic references to pattern weaving in the case of the series ποικίλος/ποικίλλειν/ποικίλμα. On *poikilos* see the remarks in Barber 1991, 359, and Wagner-Hasel 2000, 146-147, 162, 376.

<sup>126</sup> “Let us set up golden columns to support the strong-walled porch of our abode and construct, as it were, a splendid palace; for when a work is begun (ἀρχομένου δ’ ἔργου), it is necessary to make its front shine from afar” (ll. 1-4). On this opening, and in particular on the genitive absolute ἀρχομένου δ’ ἔργου see Hutchinson 2001, 377: “[T]he actual link is not with the order in which the builder would work but with the front as the beginning when one ‘reads’ or approaches the house”. Cf. Ford 2002, 124-125, who discusses both the *incipit* of *Olympian* 6 and fr. 194 S-M. Cf. Nagy 1990, 145 n. 45 on the semantics of *kosmos*; Nagy interprets Pindar fr. 194 S-M as depicting a chorus of Thebans that “is represented as if they were rebuilding the walls of Thebes, in that they are metaphorically ‘building the walls’ (τειχίζωμεν) of the *kosmos* ‘arrangement’ of the words of their song (lines 2-3)” (p. 145).

<sup>127</sup> See Aloni 1992 for a study of the ‘proemial function’ in archaic Greek poetry. Aloni notes that the main function of the archaic *proimion* is to contextualize the song, making it suitable to the (cultic, sympotic, agonistic) occasion in which it was performed.

### ***Poem as mirror-image of the kosmos: borders and ring-composition***

Before attempting to explore further the textile technological matrix of some structural patterns of archaic Greek poetry and their functioning in context, we shall return for a moment to the correspondence of world and poem to which the concept of *kosmos* seems to point. Early hexametric poetry in particular offers an excellent opportunity for investigating how formal patterns in the arrangement of the epic material are thought to reflect the cosmic order.<sup>128</sup> The poem discovers and reveals the *kosmos*, and the structure of the *kosmos* as it is described in the poem corresponds to the articulation of structural patterns framing and shaping the poem.<sup>129</sup> A remarkable instance of this set of correspondences can be appreciated in the description of the river Okeanos in the *Shield of Heracles*, a poem which was ascribed to the Hesiodic corpus by ancient editors but was most probably not composed by the poet. Just as the river-god was thought to circumscribe the earth as an encircling bond – and as, in a similar fashion, the streams of Meander, woven in the starting border, surround the fabric in Antipater’s epigram<sup>130</sup> – so the physical and civic *kosmos* depicted on Heracles’ shield in the poem is held together by the streams of Okeanos (*Aspis* 314-15):

ἄμφι δ’ ἵτυν ῥέεν Ὠκεανὸς πλήθοντι ἐοικώς,  
πᾶν δὲ συνεῖχε σάκος πολυδαίδαλον·

Around the rim ran Ocean, and it looked as though it were in full  
flood. It held together the whole richly worked shield.<sup>131</sup>

As it has been pointed out, the verb *συνεῖχε* (‘held together’) emphasizes the fact that Okeanos provides a border to the scenes represented on the shield, and it alludes to the framing function (through ring composition) performed by the description of the river within the structure of the poem as a whole. This double layer of borders suggests that “there is a correspondence between the poetic pattern and the physical object described, for the whole account of the shield is enclosed by ring-composition”.<sup>132</sup> Here we would like to propose that the borders framing both the physical *kosmos* and the poetic ‘composition-and-

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<sup>128</sup> The following discussion builds on the important insights that Thalmann 1983 has provided into the function of formal features of early hexametric poetry: the use of parataxis and the juxtaposition through polarity and analogy, typical features of the archaic style, are reinforced at the level of structural features through the use of patterns of ring composition, *hysteron proteron*, chiasmus, the use of framings as means for the ‘composer-in-performance’ to organize his thoughts and control his material as he creates and expand it through patterns. Such formal devices serve to help the audience to follow the poem throughout the performance; this is made possible by the fact that the structural patterns of hexametric poetry are not just artistic convention: rather, “they are particular manifestations of an entire way of thinking” that the poet shared with his audience (Thalmann 1983, 31). Thalmann provides structural analyses of single passages and whole poems (*Iliad*, *Odyssey*, *Theogony*, *Works and Days*, the *Homeric Hymns*, the *Shield of Heracles*) as built around recognizable patterns: these serve as the vehicle for important thematic concepts and motifs.

<sup>129</sup> See Thalmann 1983, 32: “the sense of form exemplified by the shape of the physical world as the poetry depicts it is the same as that displayed by individual passages and indeed whole poems. There is a perfect correspondence between form and content”.

<sup>130</sup> *AP* 6.287.

<sup>131</sup> The English translation is taken from the most recent Loeb edition, G. Most 2007.

<sup>132</sup> Thalmann 1983, 10, who comments on the pattern of thought that gave rise to both the cosmological view of Okeanos encircling the earth, and the invention and use of ring composition as a means of creating functional borders for the poem (or sections of it): “[S]urely the idea that the earth was surrounded by the stream of Ocean, ever turning back upon itself in a wide ring, sprang from the same source as the impulse to round off a poetic passage by recurring to the beginning at the end – a feeling for satisfying form”. A further picture of the *kosmos* on a shield is notoriously the narrative of the Shield of Achilles in *Iliad* 18, where we similarly have the river’s stream circumscribing and delimiting the earth and the narrative itself: see Nagy 2009, 269-270. Slater 1983 makes a different and strong case for the structure of ‘lyric narrative’ (in both epics and choral lyric) as complex forms of folk narrative that were then embedded into epic and lyric genres, and responded to functional and structural principles of verbal narration.

performance' (and, we shall argue, also geometric motifs in pottery) are part of a broader pattern of thought which we see reflected (if not rooted) in ancient weaving technology.<sup>133</sup>

### ***From 'bond' to 'thread' through 'rope' in archaic Greek poetics***

The serpent-shaped Okeanos is represented by early sources as a bond or band encircling the earth, with the phrase *πείρατα γαίης* occurring twice in Homer in reference to the river-god and his consort Tethys.<sup>134</sup> As it has emerged for the semantic spectrum of *πείραρ/πείρατα*,<sup>135</sup> the notions of 'cord', 'bond', 'band', 'rope' and 'thread', have material, functional and conceptual affinities: like threads, ropes and cords wind up, unroll and intertwine.<sup>136</sup> In addition to designating cosmological realities through the images of the earth-encircling bands and the binding of man's fate, this semantic field bears importance as source material for some key terms of archaic poetics.<sup>137</sup> The meaning of *οἶμος* and *οἶμη* – the first commonly assumed to mean 'pathway' (but cf. Hom. *Il.* 11.24 where *οἶμοι* is 'strips'), the second 'heroic song' – can be traced back to a common etymology and to a constellation of notions that encompasses 'trail', 'bond', 'rope' and, through a connection that emerges at the level of poetic usage, the notion of 'thread'.<sup>138</sup>

This interpretation of *οἶμη* as related to the conceptual and technological domain of textile craft seems in turn to offer a good semantic and functional explanation for the notion of the compound term *prooimion* (*προοίμιον* 'that which comes before the *oimē*'), a fundamental concept in archaic Greek poetics and a structural and cross-generic component of poetic performance whose features and phenomenology invite comparison with the crucial starting border of weaving.

The semantics of another key term of early epic poetics, *rhapsōidos* ('he who sews/stitches together the song'), is similarly grounded in the materiality of the craft of *rhaptein*, which encompassed a broader range of operations than just sewing with a thread: it involved the use of leather laces, sinews, reeds to interlace wickers or repair shoes.<sup>139</sup> Drawing on the

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<sup>133</sup> In general, the methodology of Thalmann's book is to test the relevance of structural patterns from smaller to larger scale in hexametric poetry. The opposite movement, from appreciation of structural patterns functioning for the whole poem to the testing of those same patterns (often, again, ring patterns) in smaller structures of the text, down to groups of two verses, or even a single verse, has been successfully applied to the analysis of choral lyric composition. Cairns 1997 has shown in a paper on form and meaning in Bacchylides 5 the union of tripartition and bipolarity in the poem; the functioning of ring patterns on both large and small scale throughout the poem contributes as well to an appreciation of its meaning. Curiously, Bacchylides 5 is indeed the ode where we have the metaphor of 'weaving a song' (*ὑφάνας ὕμνον* 9-10; see also ode 19.8 for the same association), which might suggest the poet's awareness of his analogical model.

<sup>134</sup> *Il.* 14.200-201 = 14.301-302.

<sup>135</sup> Onians 1951, 310-342.

<sup>136</sup> See Durante 1976, 175-176 for an exhaustive discussion of evidences in Indo-European languages.

<sup>137</sup> To the repertoire discussed here could be added the term *humēn* (*ὑμήν* 'membrane'), that we have encountered in Democritus' account of atomic conglomerates, and whose etymology has been proposed as a possible explanation for the key-concept of archaic poetics *hymnos* (*ὕμνος*).

<sup>138</sup> Pagliaro 1952, 34-40 is still a fundamental contribution to the history of the two words and their semantic development from the PIE root *\*sēi-*, whose meaning can be traced back to the idea of 'binding' and which seems to produce both *οἶμη* ('bond, trail') and *οἶμος* ('strip' as in *Il.* 11.24, and hence 'pathway'); Durante 1976, 176-179 adds further evidences to Pagliaro's insights (among which it is worth mentioning here the reconstructed root *\*ῥμη* to be found in *ῥμαῖον* (*μέλος*) 'the song of those who draw water with a rope' in Call. *Hec.* 66) and proposes for *οἶμη* the meaning of 'knotting', 'plot' ('intreccio'). Interestingly, a comparable semantic extension from the concrete ('bond', 'rope', and – through 'trail' – 'thread') to the abstract has been postulated for *πείραρ/πείρατα* and for *οἶμος/οἶμη* ('end', 'limit' in the case of *peirata*; 'pathway (of song)' in the case of *oimos/oimē*). For a recent discussion on *oimos/oimē* which draws on Pagliaro and Durante, see Nagy 2009, 230-232. For a different view on both the etymology and semantics of *oimos/oimē* in the context of a reassessment of the function and history of the term *prooimion* see Maslov 2012, 198-203: the interesting insights provided and the questions raised by this article would deserve a more detailed discussion which is not within the scope of this chapter.

<sup>139</sup> See Durante 1976, 178-179, who proposes to interpret the semantics of *rhapsōidein* as complementary to the notion of *οἶμη* and indicating "the operation that produces the condition of continuity of epic discourse",

notions of ancient weaving technology outlined in the first part of this chapter, we suggest the possibility that *rhaptō* (and thus the poetic *rhapsōdein*) might point to the technology of pattern-connection within the (material and poetic) fabric rather than indicating the tailoring of different pieces of woven fabric to produce a whole. The relevant technological idea at work here seems to be the condition of orderly structure and continuity of the threads/laces/ropes that enables such operations.

A further instance of the contiguity, in textile technology as in the early Greek mind, of the notions and crafts of weaving and sewing is offered by the term *hymnos* (ὕμνος ‘song in praise of the gods, hymn’). The etymology of the word is dubious;<sup>140</sup> a couple of stems related to the idea of weaving (making ὕμνος derive from the same verbal root ὕφ- from which ὑφαίνω originates)<sup>141</sup> and sewing (from the verbal root \*syuH that produces ὑμήν ‘membrane’)<sup>142</sup> respectively have been proposed. While the latter hypothesis is not ruled out by etymologists,<sup>143</sup> there seems to be phonological problems related to the first reconstruction (*hymnos* linked to *hyphainō*).<sup>144</sup> This leaves us with facts of poetic usage, which should be regarded as no less significant than etymology for our purpose of tracing and understanding the role of textile craft in shaping ideas of song-making. Bacchylides hints twice at the ‘popular’ etymology which sees *hymnos* as connected to *hyphainō*: ὑφάνας ὕμνον ‘having woven a song of praise (an epinician ode)’ in 5.9-10, while in 19.8 the *figura etymologica* is alluded to by the juxtaposing of the two words, which are syntactically separated by punctuation (ὕμνοισιν ὑφαίνε). Whatever the etymology of the term, when we look back at what is possibly the first attestation of ὕμνος in Greek literature, namely the *iunctura* αἰοιδῆς ὕμνος ‘hymnos of song’ (*Od.* 8.429, referred to the ‘proto-kitharodic’ performance by the bard Demodocos), the ‘materiality’ conveyed by the term seems to us to emerge strongly and to suggest the meaning of ‘fabric (made) of song’.<sup>145</sup>

The textile imagery that pervades the semantics and usage of terms like *hymnos*, *rhapsōidos* and *prooimion* is especially explicit in passages where these words occur in association with each other, in contexts where the poetics and performance practice of epic recitation is at stake. These texts will ground our discussion of the ways in which textile imagery can reflect weaving technology in the next and final section of this chapter.

In the opening lines of his second *Nemean* ode, Pindar describes the performance sequence of the rhapsodic recitation with an emphasis on its beginning, characterized by the introductory function of the *prooimion*:

ὄθεν περ καὶ Ὀμερίδαι  
 ῥαπτῶν ἐπέων τὰ πόλλ’ αἰοδοὶ  
 ἄρχονται, Διὸς ἐκ προοιμίου (...)

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namely “assembling the poetic product by arranging the threads of narration”. Drawing on the historian Philochorus (*FGrHist* 328 F 212), who interprets the origin of the name *rhapsōidoi* as a reference to their technique of composition, Gentili 1990, 7 discusses the semantics and meaning of the term *rhapsōidos* tracing it back to the materiality of textile technology: “[I]t is obvious that *rháptein* is a concrete metaphor for the process of composition, describing the operation by which the strands or web of discourse are woven together”.<sup>140</sup> See Chantraine 1968-1980, 1156 (“L’étymologie en est obscure”) and Beekes 2010, 1531 (“No certain etymology”).

<sup>141</sup> Through the sequence ὕφ-μνος > ὕμ-μνος > ὕμνος.

<sup>142</sup> See Beekes 2010, 1531.

<sup>143</sup> Both Chantraine and Beekes present this etymological derivation as possible, and point to cases like λιμήν – λίμνη and ποιμήν – ποίμνη.

<sup>144</sup> The most exhaustive discussion is again Durante 1976, 159-162: he discards both the etymologies, for phonological (ὕμνος from ὕφ-μνος) and semantic (ὕμνος linked to ὑμήν) reasons.

<sup>145</sup> See Garvie 1994, 322 (“a very odd phrase”). Interestingly, ὕμνος is *varia lectio* for οἶμος in *h.Herm.* 451 ἀγλαὸς οἶμος αἰοιδῆς. On αἰοιδῆς ὕμνος see Càssola 1975, x and Nagy 2002, 70.



just from the point where the Homeridai,  
singers of verses sewn-together, most often  
begin, from the *prooimion* of Zeus (...)

The passage is a precious source for our knowledge of rhapsodic practice, and it features an array of technical terms for epic performance. The ‘*prooimion* of Zeus’ seems to refer to the genre of rhapsodic *prooimion*, the hexametric poem that introduced the recitation of *epos* by the epic singer or the sequence of heroic lays performed by competing rhapsodes in poetic contests. The corpus of the preserved *Homeric Hymns* (which we find referred to as *prooimia* in ancient sources) attest to this very tradition.<sup>146</sup> The genitive Διός is both a generic and a functional marker: together with the verb ἄρχονται (v. 3) it situates the *prooimion* within a literary tradition of formulaic openings,<sup>147</sup> and at the same time anchors the introductory poem to the occasion of the performance (a festival in honour of a particular god); the formulaic phrase σεῦ δ’ ἐγὼ ἀρξάμενος “having started from you” is addressed to the god in the closing line of several *Homeric Hymns* (5, 9, 18, 21, 22), where it effects the transition from the *prooimion* to the *oimē* (i.e. the epic recitation) through a further formulation, μεταβήσομαι ἐς ἄλλον ὕμνον (“I will switch to another *hymnos*/to the rest of the *hymnos*”).<sup>148</sup> Pindar’s paraphrastic definition of *rhapsōidoi* (ῥαπτῶν ἐπέων ἀοιδοί) became the object of a vast array of interpretations in ancient time as regards the nature of the ‘sewing together’ of Homeric *epē* on the part of the *Homeridai* (and in general the performers of epic poetry).<sup>149</sup> The scholia associate rhapsodic poetics with the sewing in a sequence (εἰρμῶ καὶ ῥαφῇ) of scattered parts of Homeric poetry (Σ Pind. N. 2.1d), or with the practice of reciting parts of the Homeric poems in an ordered sequence, so as to perform the whole poem (Σ Pind. N. 2.1d). The scholiast then goes on to offer a poetic fragment, attributed to Hesiod by the Attidographer Philochorus (Hes. fr. 357 M.-W. = 297 Most):

ἐν Δήλῳ τότε πρῶτον ἐγὼ καὶ Ὅμηρος ἀοιδοὶ  
μέλπομεν, ἐν νεαροῖς ὕμνοις ῥάψαντες ἀοιδὴν,  
Φοῖβον Ἀπόλλωνα χρυσάορον, ὃν τέκε Λητώ

In Delos then for the first time Homer and I, singers,  
sang, sewing our song in new *hymnoi*,  
of Phebo Apollo with his golden sword, whom Leto bore.

Here again, the close association between the craft of poetic *rhaptein* and *hymnoi* suggests taking ὕμνοι in the sense of ‘fabrics’ of song(s), or even ‘pattern connexions (of verses)’,<sup>150</sup> the poetic product that Homer and Hesiod compose ῥάψαντες (‘sewing/weaving together the song’).

<sup>146</sup> See Aloni 1980 for a study of the history of the term in reference to the *Homeric Hymns*, their structure and performative function. The 5<sup>th</sup> century usage of *prooimion* and *phroimion* (its Attic form) in drama and prose is investigated by Maslow 2012.

<sup>147</sup> ἄρχομαι + the genitive of the god appears in *incipit* in e.g. *h.Hom.* 25 and Hesiod’s *Theogony* (in Alcman *PMG* 29 we find ἐκ Διὸς ἀρχομένα); in a number of the shorter *Homeric Hymns* (11, 13, 16, 22, 26, 28, 31) and in *h.Cer.* ἄρχομαι introduces the infinitive ἀεῖδειν (‘to sing’) + the accusative of the god celebrated. On the different scope of the two types of opening see Càssola, who considers the shorter *Homeric Hymns* as extracts from longer *prooimia*.

<sup>148</sup> The transitional formula μεταβήσομαι ἐς ἄλλον ὕμνον could be considered to belong in the domain of motion metaphor for poetic creation – a category in which *oimē-oimos*, when interpreted as instance of road-imagery (‘pathway’) may as well fall: see Thalmann 1984, 124.

<sup>149</sup> A detailed discussion of the ancient scholarly interpretation of Pindar *N.2.2* is offered by Nagy 1996, 66–69.

<sup>150</sup> Thus drawing on the etymological derivation of ὕμνος from the same verb-root as ὁμήν.

### ***Starting borders in archaic Greek poetry: hymnos and prooimion in context***

In what follows we will show how the pattern of an ordering beginning seems to have been transferred from weaving to poetic composition and performance, and how this pattern works in context. This in turn poses the question whether, in some specific cases, we are dealing with poetic metaphors, or whether textile terms are rather employed as technical terms.

The most consistent and sustained theory of a metaphoric of textile crafts (weaving, threading, sewing/stitching) that invests the poetics of early Greek epic has been produced by Gregory Nagy and refined throughout a number of scholarly works:<sup>151</sup> his is the first attempt to see the concept of the starting border in weaving as reflected (metaphorically, in his view) in the function and phenomenology of *hymnos* and *prooimion* in the case where the two terms are coextensive, *i.e.* in the rhapsodic performance, where the introductory *hymnos/prooimion* “refers to a notionally perfect beginning”.<sup>152</sup> The character of ‘right’ or ‘absolute’ beginning of the hymnic performance as we have it in the *Homeric Hymns* is effected by two markers: a) the use of the verb ἄρχεσθαι, “which signals the invocation of the god or goddess who presides over the occasion of performance”, and b) the transition to the rest of the performance, which the transitional formula (‘metabasis’ in Nagy’s words) μεταβήσομαι ἄλλον ἐς ὕμνον marks metonymically as a *hymnos* (“the *hymnos* can make reference to its own hymnic consequent”).<sup>153</sup> The *hymnos* is thus a performative continuum which encompasses the *prooimion* as its start, and whose wholeness is marked by its beginning: “the *hymnos* is not just a proem that introduces epic but also the sequencing principle that connects with epic, then extends into epic, and then finally becomes the same thing as epic itself”.<sup>154</sup> The idea of a beginning which makes a whole out of what follows from it, is the feature that the poetics of rhapsodic performance receives from weaving technology, and in particular from the mechanism of the starting border.<sup>155</sup> this intuition is grounded in the semantics and performance reality of the words *hymnos*, *prooimion*, *oimē* and *rhapsōidos* (all of which are rooted in the craft of fabric-making), and tested in the context of the poetics of the Panathenaic festival in Athens, where the rhapsodic recitation of Homeric poetry and the gigantic *peplos* woven for the statue of Athena are connected through the idea of *hymnos* and its divinely authorized beginning.<sup>156</sup> It is worth quoting the core of Nagy’s argument in his own words:

[...] the general process of weaving as a metaphor is applied by epic to the specific activity of performing epic. The prime example I cited was the word *oimē*, which refers metaphorically to the ‘story-thread’ that begins the epic performance of the singer Demodocus in *Odyssey* viii 74. Such a beginning of epic, as we saw from the wording of Pindar’s *Nemean* 2 (line 3), is a *prooimion*, which is metaphorically the starting point of the threading, of the *oimē*. Comparable to this Greek *prooimion* is the Latin *exordium* ‘proemium’. Both words are applicable to the beginning of a song, a poem, or a speech.

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<sup>151</sup> Nagy 1990, 1996, 2002, 2009.

<sup>152</sup> Nagy 2009, 232, from which as well the next citations in the text are taken.

<sup>153</sup> See Nagy 2009, 241 “[I]n other words, the concept of *hymnos* is the concept of maintaining the song as the notionally same song by way of successfully executing a metabasis from the initial subject to the next subject.”

<sup>154</sup> Nagy 2002, 70.

<sup>155</sup> See Nagy 2002, 79 “[H]ere I return to my thesis, that the idea of *weaving*, just like the idea of *hymnos*, is connected with the idea of *beginnings*. The essential point is the *point of departure*. Wherever you begin, you must have a continuum that follows [...] The wholeness of the performance is authorized by the beginning. To repeat, *arkhē* is both beginning and authorization.”

<sup>156</sup> The ritual implications of the starting of the weaving (the making of the starting border) for the *peplos* of Athena at the *Khalkeia* festival in Athens (on which Arist. *Ath.* 60.1-3) are discussed in Nagy 2002, 86-88 and 2009, 550, 568.

[...] the specific meanings of the Greek nouns *oimē* and *prooimion* are related to the general meaning of the noun *humnos*, which I interpreted etymologically as the overall process of weaving as expressed by the verb *huphainein* ‘weave’. So the question is, can we say that the performing of epic in the age of Pheidias is visualized metaphorically as the work of male weavers in particular? In formulating the answer, I start with the metaphor inherent in the technical poetic term *prooimion*. In terms of this metaphor, a performance started by a singer is like a web started by a weaver. Performing the *prooimion* is like weaving the *exastis* which is a technical term for the initial phase of the weaving.<sup>157</sup>

Nagy grounds the semantics of the compound *rhapsōidos* in the performance context of the rhapsodic contest in the occasion of the Panathenaic festival in Athens; there, the competing bards recited pieces of Homeric epic in an orderly sequence, one picking up where the other had stopped.<sup>158</sup> From the point of view of the performance structure of such a rhapsodic contest, the *hymnos/prooimion* represented the first rhapsody in the sequence of successive recitations of Homeric *epē*.<sup>159</sup> Pursuing Nagy’s argument, one might go further and suggest that the threads that unfolded from the *hymnos/prooimion*, just like the warp which is governed by the starting border, developed different patterns and narrative motifs throughout the rhapsodies performed by the competing singers.<sup>160</sup>

A characteristic feature of the rhapsodic *prooimion* as we have it preserved in the *Homeric Hymns* is its function of linking the recitation of epic poetry to the occasion of the performance. This implied to pay poetic omage to the god in whose honour the festival hosting the rhapsodic contest was celebrated: as a consequence, the thematic relation between the content of the *prooimion* (a hymnic address to a god) and the heroic lays narrated in the *oimē* was often very loose.

Looking for a sample of epic/rhapsodic poetry that might reflect in its structure the function of the starting border – *i.e.* providing the warp threads for the weave, as well as the sequencing principles for the patterns to be woven into the fabric – we would rather turn to the only preserved sequence *prooimion-oimē* in hexametric poetry, namely Hesiod’s *Theogony*.<sup>161</sup> Here the threads of the poem’s warp, *i.e.* the themes of the divine genealogies which unfold throughout the *oimē*, are outlined as a poetic ‘program’ and embedded in the structure of the *prooimion*, a ‘hymn to the Muses’ (ll. 1-115) which bears strong formal

<sup>157</sup> Nagy 2009, 568-569.

<sup>158</sup> On the so-called ‘Panathenaic Rule’, *i.e.* the regulation that imposed the recitation of Homeric *epē* in sequence at the rhapsodic contest during the Panathenaic festival see Nagy 2002, 9-20.

<sup>159</sup> See Càssola 1975, xiii-xxxi, who (xix) points out that the term *προοίμιον* could be used to denote both the beginning of a poem (which Càssola calls ‘esordio’) and a poem having an introductory function (the ‘proper’ *prooimion*, that featured an ‘esordio’ of its own – expressed by Greek ἀναβολή: see the ἀμβολαὶ προοιμίων in Pind. *P.* 1.4).

<sup>160</sup> In such a sequence of rhapsodies, we see the technology of *rhaptein* as encompassing the notion of ‘pattern connections’ within a pattern-woven fabric, rather than pointing to the craft of tailoring. For the hypothesis that rhapsodic contests featured ‘closing *hymnoi*’ see Càssola 1975, xxi-xxii.

<sup>161</sup> See Hamilton 1989, 11 “[T]he *Theogony* in fact is our best evidence for the function of the Homeric hymn as proem to a longer song.” For the ‘rhapsodic’ nature of the *Theogony* see Càssola 1975, xxi, who recognizes in the structure of the poem (as we have it) several ‘stitches’ indicating successive rhapsodies (*e.g.* the leave-off at ll. 963-964 ‘Farewell now to you ...’ is followed by a new ‘esordio’ at ll. 965-968 ‘And now, sweet-voiced Olympian Muses, daughters of aegis-holding Zeus, sing of the tribe [φῶλον] of goddesses ...’). Hamilton 1989, 15 further observes that the third invocation to the Muses (ll. 1021-1022), with which the *Theogony* concludes in medieval manuscripts, is the opening of the *Catalogue of Women* (see fr. 1 Most).

resemblances with the corpus of the extant *Homeric Hymns*.<sup>162</sup> The structure of the *prooimion* is complex. We have a first shorter *hymnos* to the Heliconian Muses, introduced by the formulaic beginning Μουσάων Ἑλικωνιάδων ἀρχώμεθ' αἰδεῖν ("Let us begin to sing from the Heliconian Muses")<sup>163</sup> and describing the Muses singing and dancing on Mount Helicon (1-21) and performing a *hymnos* for the gods (ὑμνεῦσαι 11). This is followed by Hesiod's poetic investiture by the Muses (22-34), who command the poet to sing a *hymnos* (ὑμνεῖν 33) on the subject of 'the race of the blessed ones' (μακάρων γένος 33). After a transitional line (35), a new *hymnos* begins much like the first (Μουσάων ἀρχώμεθα 36), and ends with a formulaic leave-off at l. 104 where the poet bids the Muses farewell (χαῖρετε, τέκνα Διός, δότε δ' ἡμερόεσσιν αἰοιδήν "hail children of Zeus, and give me lovely song"). The second part of the *prooimion*, a *hymnos* to the Olympian Muses (36-103), contains a description of the Muses singing on Olympus about the *genos* of the gods (but beginning and ending with Zeus, ll. 47-49), then an account of the Muses' birth, their journey to Olympus, and their gifts to kings and poets. In a long transitional passage which introduces to the *oimē* (104-115), Hesiod commands the Muses to sing of divine genealogies, providing a sequence of three main topics which will then be followed in the central rhapsody of the poem.<sup>164</sup> It is beyond the scope of this chapter to discuss in detail the structure of this *prooimion*, where correspondences between the first, shortest *hymnos* (1-35) and the second one (36-103) not only regard formal features and recurring motifs, but invest broader thematic concerns of the poem as a whole.<sup>165</sup> Relevant for the present discussion are three observations that arise from a reading of the proemial 'hymnos to the Muses' in Hesiod's *Theogony*: a) the emphasis on beginning (this *prooimion* contains three beginnings),<sup>166</sup> and the related fact that the poet feels the need to start from the Muses again when he turns to the 'second' *hymnos* after the account of his poetic initiation (at line 36);<sup>167</sup> b) the metaliterary motif of the choral dancing of the Muses as divine paradigm for human songs: much like the god providing the *archē* ('beginning' and 'authorization') in the *Homeric Hymns*, this is their function of providing 'divine authorization' in the proem of the *Theogony*, thus enabling Hesiod to *hymneîn* ('celebrate by means of a *hymnos*') the divine genealogies; c) the transition from the *prooimion* to the *oimē* is effected by means of an accurate description of the sequence of 'figurative patterns' that the starting border 'governs', and that constitute the condition for the continuity of the fabric (and of the main body of the *Theogony*).

In the first half of this chapter, it has been argued that the starting border is a crucial *condition* for weaving on a warp-weighted loom: in a similar fashion, the cross-generic *prooimion*

<sup>162</sup> On the importance of this feature for the overall structure of the *Theogony* see Hamilton 1989, 3 "[T]he crucial fact about the form of the *Theogony*, one virtually ignored by critics, is that the poem is articulated by the outline of its content given at the end of the hymn with which it begins."

<sup>163</sup> Hesiod seems here to conflate two different rhapsodic formulaic beginnings: the type ἄρχομαι + genitive of the god(s), and the type ἄρχομαι + αἰδεῖν + accusative of the god(s); as West 1966, 151 observes, in *Theog.* 1 "the genitive is governed by ἀρχώμεθα (αἰδεῖν being complementary)". On Hesiod's use of the first person plural here as to include the Muses in his exhortation, see Strauss Clay 2003, 51-52, who also remarks how the construction with the genitive "reveals that the Muses constitute the appropriate or even necessary starting-point for Hesiod's song, but that they are not its object" (p. 53). The English translation of Hesiod's *Theogony* is Most 2007 (Loeb) adapted.

<sup>164</sup> The three themes are (quoting from Hamilton 1989, 14-15): "(1) the children of Gaia and Ouranos, Night and Pontos (106-107); (2) their children (111); (3) how they divided healt and *timai* and first got Olympus"; Hamilton shows how these three topics are consistently developed in the structure of the *Theogony*.

<sup>165</sup> See, among others, the rich discussion in Thalmann 1983, 134-152.

<sup>166</sup> Strauss Clay 2003, 52-53 aptly remarks how the motif of beginning is especially in place in a poem which sets up to provide an account of cosmological beginnings: "[T]he proem of the song of beginnings, thus even as it makes its beginning, attempts to give and account of its beginning."

<sup>167</sup> See the remarks by West 1966, 151. For the possible juxtaposition of two successive 'starting bands' in weaving, see above n. xx.

fulfils a fundamental function in archaic Greek poetics, connecting the song to the occasion of its performance<sup>168</sup> and providing a necessary (musical and poetic) introduction to the rhapsody (epic), the *nomos* (kitharody)<sup>169</sup> or the choral song (melic).<sup>170</sup>

The pattern of ‘embedded’ *prooimia* is still recognizable in a sample of choral lyric which features the motif of the ‘song that starts another song’ or describes the practical modalities of the performance:<sup>171</sup> Alcman 14 *PMG* consists in an invocation to the Muse to ‘begin a new song (μέλος νεοχμόν) for girls to sing’;<sup>172</sup> Pindar’s first *Pythian* ode begins with a proemial invocation to the lyre and the description of a performance by Apollo and the Muses, where the god strikes up with his lyre “instrumental preludes to chorus-leading *prooimia*.”<sup>173</sup> The beginning of the second *Nemean*, as we have shown in the previous section, is a precious evidence for the reconstruction of the performance of Homeric poetry enacted by the rhapsodic guilds: the ode is indeed unique within the corpus of Pindar’s epinician odes in that it seems to show features typical of a *prooimion*: it is unusually short, and its closing lines, with the chorus inviting to lead-off (*exarkhein*) a song in honour of Zeus, resembles the transitional passages that close *prooimia* and lead into the ‘proper’ song.

The procession of gods painted on the main frieze of the François Vase (fig. 7) accompanies and celebrates the wedding of Peleus and Tethys. We choose here to draw attention to the *prooimion* that the Muses sing and dance on the occasion of this divine wedding in Pindar’s *Nemean* 5.22-26:

Πρόφρων δὲ καὶ κείνοις ᾄειδ’ ἐν Παλίοῳ  
Μοισᾶν ὁ κάλλιστος χορὸς, ἐν δὲ μέσαις  
φόρμιγγ’ Ἀπόλλων ἐπτάγλωσσον  
    χρυσέῳ πλάκτρῳ διώκων  
ἀγεῖτο παντοίων νόμων· αἱ δὲ πρότιστον μὲν ὕμνη-  
    σαν Διὸς ἀρχόμεναι σεμνὰν Θέτιν  
Πηλέα θ·

Gladly did that fairest chorus of the Muses  
sing for those men on Pelion, while in their midst  
Apollo swept his seven-tongued lyre  
with a golden plectrum,  
and led them in tunes of all kind. And, after a prelude to Zeus, they first sang of august Thetis  
and Peleus (...)

Apollo and the Muses are here mirror images for the kitharodos accompanying the epinician chorus: Apollo plays a prelude on the lyre, and the Muses move to sing a *hymnos* beginning

<sup>168</sup> Aloni 1990, 119 observes that “the *prooimion* is not, and could not be, a literary genre with pre-determined formal and content-related features, that recur regularly. We are rather dealing with a function, or a necessity of the performance; as a consequence, all the elements characterizing it are to be placed at the level of pragmatics” (our translation).

<sup>169</sup> Power 2010, 185-215 provide an excellent and exhaustive treatment of the terminology and phenomenology of the kitharodic *prooimion* and its connections with the rhapsodic *prooimion*.

<sup>170</sup> On the *prooimion* as introductory feature of any act of speech, and as an established practice in oratory speech see Aloni 1980, Maslov 2012. On Plato’s recurrent puns on the kitharodic sequence *prooimion-nomos* (where *nomos* stands for both ‘song genre’ and ‘law’) see Power 2010, 189 who aptly quotes *Timaeus* 29d and Socrates’ address to Timaeus, who has started lecturing on cosmological theories: “[W]e have welcomed, then, your *prooimion* with wondrous admiration, but, following the sequence, begin to perform for us the *nomos*.”

<sup>171</sup> See the remarks in Aloni 1990, 117-121; in the remainder of his essay (pp. 121-129), Aloni tackles the complex problem of the phenomenology of the *prooimion* and the ‘proemial function’ in Pindar’s epinician odes.

<sup>172</sup> The translation of Alcman is by D. A. Campbell (Loeb).

<sup>173</sup> Translation: Powell 2010, 202.

from Zeus (ὑμνησαν ἀρχόμεναι Διός l. 25), a *prooimion* introducing the narrative of Peleus' heroic deeds. Much like in the *prooimion* of Hesiod's *Theogony*, we have here a vivid representation of divinely authorized and authorizing singing.

As a last instance of textile-like patterns in poetry, the mirror image of the Muses singing and dancing within a poem or a song, and replicating their performance *ad libitum*, reminds us of the pattern-woven cloth that both the Muses and the Moira wear in the François Vase (fig. 3). The figured motif in the Moira's cloth reduplicates the frieze's picture in a virtually endless Chinese box. As the Muses provide the epic singer with οἶμας παντοίας ('songs/threads of every sort') and with poetic authority through their divine performance, so the Moirai/Fates provide men with the thread(s) of one's destiny (fig. 7). We have tried to show that there is a convergence in the terminology, imagery and conceptual representation of these two sets of divinely given threads.

### Conclusion

What we tried to show in our technological part is that weaving in antiquity is not a clear gesture nor a simple unification of opposites but a complex composition of woven and plaited parts integrated into a finished product by repeated gestures of turning the piece around or upside down. The scheme Karl Schlabow once made when reconstructing the Thorsberg mantle might demonstrate this complexity (fig. 8) and give an example of what archaic Greek poets had in mind and view when using weaving terms to describe poetic composition principles that not yet had their own terminology.

We assume that, starting with Pherecydes, weaving gives a possible answer to the question of how the order of the *kosmos* was and is produced and which generative principles are at work in the *kosmos* and thus in every *technē*. We have argued that specific features of ancient weaving like the starting-border or the repeated integration of bands into textiles (cf. fig. 8) can be recognised in the use of textile terms in ancient texts. Referring to textiles indicates a mode of invention or creation that differs considerably from the way in which poetry is perceived today, namely as a form of art including the concept of the artist creator who designs his work according to an idea in his mind. Such modern concept has influenced the understanding of both the history of Greek art as well as the history of technology.<sup>174</sup> It is especially the discussion of formulae or prototypes in archaic poetry and geometric art where this still affects the argumentation that often starts to become polemic as soon as textiles are claimed to be the the medium of memory and transfer throughout the Dark Ages.<sup>175</sup>

Homeric poetry has been consistently compared with Geometric pottery (especially Dipylon vases) on the ground of structural and compositional features, among which the framing function of rings bears a special relevance: "there is a circular composition also of scenes themselves (*sc.* in Homer), scenes framing scenes in concentric rings around centrepieces, exactly as central motifs are heavily framed by borders in Geometric paintings."<sup>176</sup> In turn, pictorial friezes and meander motifs of Geometric vases have been traced back to figured textiles with in-woven mytho-histories.<sup>177</sup>

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<sup>174</sup> The origins of modern art and modern technology have in common that they refer to the concept of invention, called *disegno* in the discourse of renaissance, cf. Blumenberg 2015, 27.

<sup>175</sup> For example in the reaction on Bensons book on the origins of Greek art (1970) by Coldstream (1974) and Hoffman (1997). Hoffman's book on imports from the Near East to Iron Age Crete deals with bronzes, faience, glass, gold, ivory, lead, pottery, scarabs, and even stone. However textiles are only mentioned in a footnote referring to the thesis of a textile continuity behind pottery and not saying anything about possible imports. Cf. note 3 on page 155.

<sup>176</sup> Whitman 1958, 98.

<sup>177</sup> Drawing on textual, iconographical and archaeological evidences, enriched by her own expertise as a weaver (see p. 365 "[T]o a weaver, early Greek vases look like textiles from the start"), Barber 1991, 358-372

Discussing the idea of friezes in Greek geometric art, Benson argues that “the impetus to depict a procession is more likely to have come at least partly from specific contemporary interest such as epic poetry (...). At that point, it would have been recalled that such vases and perhaps such wall paintings once existed”.<sup>178</sup> Benson does not refer to textiles here as there are only secondary sources (texts) but no objects available. However he repeatedly points out the possibility of the artists being influenced by patterned textiles and the frieze lends itself to the constructive principle of weaving progressing in rows.

The principles of weaving are recognizable in the structure of the archaic Greek poem through the ring-sequence of frames and narrative sections. The sequence of geometric borders and pictorial friezes on the François Vase and on the clothes of both the Moira and the Muses represents a further instance of such a pervasive pattern stemming from weaving technology. The ordering and connecting *prooimion* in poetry reflects in both its terminology and function the thought pattern of the starting border in weaving. The ‘proemial function’ has been shown to represent a key performative and compositional pattern of archaic song-making: a remarkable cross-generic trait, it creates the condition for the rhapsodic and kitharodic performance and is embedded in the structure of choral lyric odes.

We end our chapter with a passage from Euripides *Ion*, where translators are at pains to make sense of the juxtaposition of *kerkis* (shuttle) and *logos* (word) on the same level and, applying the results of our study to our translation, propose to accept that *kerkis* and *logos* might have the same value.<sup>179</sup>

οὐτ’ ἐπὶ κερκίσιν οὔτε λόγοις<sup>180</sup> φάτιν  
ἄιον εὐτυχίας μετέχειν θεόθεν τέκνα θνατοῖς

Not by shuttles nor by words has it ever been rumoured  
that godly children meant a share of blessing for mortals.

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rounds off a very convincing argument to ground her hypothesis that “[...] less-destructible arts – vases, terracottas, and later sculptured reliefs – were deriving their forms and concepts” from figured textiles.

<sup>178</sup> Benson 1970, 55-56.

<sup>179</sup> The two nouns are generally interpreted as pointing to the practice of singing while weaving, and making reference to ‘songs to the loom’ which accompanied textile activity. In the case of the expression ἐπὶ κερκίσιν, the plural of κερκίς is taken as a reference (via metonymy) to the loom and the expression translated as ‘stories at the/my loom’ (Kovacs, Tuck 2009) or simply ‘at the loom’ (Lee 1997), as paralleled to λόγοις, interpreted as ‘common talk’ (Tuck), ‘songs’ (Kovacs), or ‘telling of stories’ (Lee): drawing on other passages in Euripides that refer to in-woven mythical stories (Eur. *Ion* 196-200, *Hec.* 466-474, *IT* 221-224) Tuck argues for the possibility that “the retelling of such myths in the service of patterned textile production may have sometimes even related to the design motifs themselves”.

<sup>180</sup> We print the text of L: Diggle (OCT) brings into his text Badham’s λόγων, while Kovacs (Loeb) puts λόγοις between *cruces*.

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